Panoramic Table of Deep Insight Algorithms (English Version)

Panoramic Table of Deep Insight Algorithms

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No.	Insight Task / Objective	Algorithm Family (Level 1)	Level-2 Task / Sub-objective	Typical Algorithms / Representative Methods (with common variants)	Key Inputs	Key Outputs (Insight Artifacts)	Evaluation Metrics / Audit Evidence
1	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 1)	Robust summary (Huber/M-estimator) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
2	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Quantiles/ Tail Risk (Variant 2)	Quantile & tail metrics (VaR/ES, QQ diagnostics) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
3	Descriptive Deep Insights (Structure + Distribution +	Descriptive Statistics & Distribution Model	DistributionFittingComparison (Variant 3)	L-moments / trimmed moments | Extensions: ablation,	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,

	Differences)	ing		hyperparameter sweep, robustness checks			
4	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Structure (Copula) (Variant 4)	Copula models (Gaussian/t/Archimedean) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
5	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 5)	Distribution selection (AIC/BIC) + goodness-of-fit (KS/AD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
6	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 6)	Robust summary (Huber/M-estimator) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
7	Descriptive Deep	Descriptive	Quantiles/ Tail Risk	Quantile & tail	Data/Logs//Metrics	RobustStatistics, Tail	GOF(AD/KS),

	Insights (Structure + Distribution + Differences)	Statistics & Distribution Modeling	(Variant 7)	metrics (VaR/ES, QQ diagnostics) | Extensions: ablation, hyperparameter sweep, robustness checks		Risk, DistributionStructure	Robust(bootstrap), Coverage,
8	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	DistributionFittingComparison (Variant 8)	L-moments / trimmed moments | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
9	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Structure (Copula) (Variant 9)	Copula models (Gaussian/t/Archimedean) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
10	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 10)	Distribution selection (AIC/BIC) + goodness-of-fit (KS/AD) | Extensions: ablation, hyperparameter	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,

				sweep, robustness checks			
11	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 11)	Robust summary (Huber/M-estimator) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
12	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Quantiles/ Tail Risk (Variant 12)	Quantile & tail metrics (VaR/ES, QQ diagnostics) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
13	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	DistributionFittingComparison (Variant 13)	L-moments / trimmed moments | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
14	Descriptive Deep Insights (Structure + Distributi	Descriptive Statistics & Distribution	Structure (Copula) (Variant 14)	Copula models (Gaussian/ t/Archimedean) | Extension	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverag

	on + Differences)	Modeling		s: ablation, hyperparameter sweep, robustness checks			e,
15	Descriptive Deep Insights (Structure + Distribution + Differences)	Descriptive Statistics & Distribution Modeling	Robust (Variant 15)	Distribution selection (AIC/BIC) + goodness-of-fit (KS/AD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs//Metrics	RobustStatistics, Tail Risk, DistributionStructure	GOF(AD/KS), Robust(bootstrap), Coverage,
16	Group Differences & Statistical Significance Insights	Statistical Testing	(Variant 1)	t-test / Welch t-test + effect size (Cohen's d) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
17	Group Differences & Statistical Significance Insights	Statistical Testing	Distribution (Variant 2)	Mann–Whitney U / Wilcoxon signed-rank | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust

18	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 3)	ANOVA / Kruskal–Wallis + post-hoc (Tukey/Dunn) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
19	Group Differences & Statistical Significance Insights	Statistical Testing	/ (Variant 4)	Permutation test + bootstrap CI | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
20	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 5)	Multiple testing control (BH-FDR/Bonferroni) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
21	Group Differences & Statistical Significance Insights	Statistical Testing	(Variant 6)	t-test / Welch t-test + effect size (Cohen's d) | Extensions: ablation, hyperparameter	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust

				sweep, robustness checks			
22	Group Differences & Statistical Significance Insights	Statistical Testing	Distribution (Variant 7)	Mann–Whitney U / Wilcoxon signed-rank | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
23	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 8)	ANOVA / Kruskal–Wallis + post-hoc (Tukey/Dunn) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
24	Group Differences & Statistical Significance Insights	Statistical Testing	/ (Variant 9)	Permutation test + bootstrap CI | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
25	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 10)	Multiple testing control (BH-FDR/Bonferroni) | Extension	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust

				s: ablation, hyperparameter sweep, robustness checks			
26	Group Differences & Statistical Significance Insights	Statistical Testing	(Variant 11)	t-test / Welch t-test + effect size (Cohen's d) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
27	Group Differences & Statistical Significance Insights	Statistical Testing	Distribution (Variant 12)	Mann–Whitney U / Wilcoxon signed-rank | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
28	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 13)	ANOVA / Kruskal–Wallis + post-hoc (Tukey/Dunn) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
2	Group	Statist	/ (Variant	Permutati	Samples, /Quasi-	+Effect	p/CI,

9	Differences & Statistical Significance Insights	ical Testing	14)	on test + bootstrap CI | Extensions: ablation, hyperparameter sweep, robustness checks	experimentData	size+Confidence interval+Interpretable	Effect size, FDR, , Robust
30	Group Differences & Statistical Significance Insights	Statistical Testing	Comparison (Variant 15)	Multiple testing control (BH-FDR/Bonferroni) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples, /Quasi-experimentData	+Effect size+Confidence interval+Interpretable	p/CI, Effect size, FDR, , Robust
31	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 1)	Partial correlation network | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
32	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 2)	Graphical Lasso / sparse inverse covariance | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,

33	Multivariate Association Structure Insights	Dependence Structure Learning	Network (Variant 3)	Distance correlation / MIC | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
34	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 4)	HSIC (kernel dependence) | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
35	Multivariate Association Structure Insights	Dependence Structure Learning	Structure (Variant 5)	Stability selection + bootstrap graph | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
36	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 6)	Partial correlation network | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
37	Multivariate	Dependence	(Variant 7)	Graphical Lasso /	()	Network, , StructureInt	Stability, , Edge

	Association Structure Insights	Structure Learning		sparse inverse covariance | Extensions: ablation, hyperparameter sweep, robustness checks		erpretation	confidence,
38	Multivariate Association Structure Insights	Dependence Structure Learning	Network (Variant 8)	Distance correlation / MIC | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
39	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 9)	HSIC (kernel dependence) | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
40	Multivariate Association Structure Insights	Dependence Structure Learning	Structure (Variant 10)	Stability selection + bootstrap graph | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
41	Multivariate	Dependence	(Variant 11)	Partial correlatio	()	Network, , StructureInt	Stability, , Edge

	Association Structure Insights	Structure Learning		n network | Extensions: ablation, hyperparameter sweep, robustness checks		erpretation	confidence,
42	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 12)	Graphical Lasso / sparse inverse covariance | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
43	Multivariate Association Structure Insights	Dependence Structure Learning	Network (Variant 13)	Distance correlation / MIC | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
44	Multivariate Association Structure Insights	Dependence Structure Learning	(Variant 14)	HSIC (kernel dependence) | Extensions: ablation, hyperparameter sweep, robustness checks	()	Network, , StructureInterpretation	Stability, , Edge confidence,
45	Multivariate Associatio	Dependence Struct	Structure (Variant 15)	Stability selection +	()	Network, , StructureInterpretation	Stability, , Edge confiden

	n Structure Insights	ure Learning		bootstrap graph | Extensions: ablation, hyperparameter sweep, robustness checks			ce,
46	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	Structure (Variant 1)	PCA + loadings interpretation | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
47	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	(Variant 2)	ICA (FastICA) | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
48	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	Interpretable (Variant 3)	NMF + topic-like factors | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
49	Dimensionality Reduction & Principal-Structure	Dimensionality Reduction / Manif	(Variant 4)	UMAP / t-SNE | Extensions: ablation, hyperpara	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable

	Insights	old Learning		meter sweep, robustness checks			
50	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	VisualizationStructure (Variant 5)	Diffusion Maps / PHATE | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
51	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	Structure (Variant 6)	PCA + loadings interpretation | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
52	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	(Variant 7)	ICA (FastICA) | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
53	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	Interpretable (Variant 8)	NMF + topic-like factors | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
5	Dimensio	Dime	(Variant	UMAP / t-	/Outputs	Structure,	, ,

4	nality Reduction & Principal-Structure Insights	nsionality Reduction / Manifold Learning	9)	SNE | Extensions: ablation, hyperparameter sweep, robustness checks		Interpretation, Visualization	Stability, Interpretable
55	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	VisualizationStructure (Variant 10)	Diffusion Maps / PHATE | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
56	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	Structure (Variant 11)	PCA + loadings interpretation | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
57	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	(Variant 12)	ICA (FastICA) | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
58	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold	Interpretable (Variant 13)	NMF + topic-like factors | Extensions: ablation, hyperpara	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable

		Learning		meter sweep, robustness checks			
59	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	(Variant 14)	UMAP / t-SNE | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
60	Dimensionality Reduction & Principal-Structure Insights	Dimensionality Reduction / Manifold Learning	VisualizationStructure (Variant 15)	Diffusion Maps / PHATE | Extensions: ablation, hyperparameter sweep, robustness checks	/Outputs	Structure, Interpretation, Visualization	, , Stability, Interpretable
61	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 1)	k-means / k-medoids | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
62	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 2)	HDBSCAN / DBSCAN | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
63	Clustering Insights	Clustering	Clustering (Variant	Hierarchical	//	, , Anomalies	Silhouette/DBI,

	(Group Profiling)		3)	clustering (Ward/complete) | Extensions: ablation, hyperparameter sweep, robustness checks			Stability, Interpretable, Inter-annotator agreement
64	Clustering Insights (Group Profiling)	Clustering	ModelClustering (Variant 4)	Gaussian Mixture Models | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
65	Clustering Insights (Group Profiling)	Clustering	Clustering Interpretation (Variant 5)	Prototype explanation + cluster labeling rules | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
66	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 6)	k-means / k-medoids | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
67	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 7)	HDBSCAN / DBSCAN |	//	, , Anomalies	Silhouette/DBI, Stability, Interpret

				Extensions: ablation, hyperparameter sweep, robustness checks			able, Inter-annotator agreement
68	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 8)	Hierarchical clustering (Ward/complete) | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
69	Clustering Insights (Group Profiling)	Clustering	ModelClustering (Variant 9)	Gaussian Mixture Models | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
70	Clustering Insights (Group Profiling)	Clustering	Clustering Interpretation (Variant 10)	Prototype explanation + cluster labeling rules | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
71	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 11)	k-means / k-medoids | Extensions:	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable,

				ablation, hyperparameter sweep, robustness checks			Inter-annotator agreement
72	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 12)	HDBSCAN / DBSCAN | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
73	Clustering Insights (Group Profiling)	Clustering	Clustering (Variant 13)	Hierarchical clustering (Ward/complete) | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
74	Clustering Insights (Group Profiling)	Clustering	ModelClustering (Variant 14)	Gaussian Mixture Models | Extensions: ablation, hyperparameter sweep, robustness checks	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator agreement
75	Clustering Insights (Group Profiling)	Clustering	Clustering Interpretation (Variant 15)	Prototype explanation + cluster labeling rules | Extensions: ablation,	//	, , Anomalies	Silhouette/DBI, Stability, Interpretable, Inter-annotator

				hyperparameter sweep, robustness checks			agreement
76	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 1)	LDA (collapsed Gibbs / variational) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
77	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 2)	HDP (nonparametric) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
78	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 3)	CTM / STM (correlated / covariates) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
79	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 4)	Dynamic Topic Model (DTM) | Extensions:	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-

				ablation, hyperparameter sweep, robustness checks			annotator agreement, Reproducibility
80	Topic Insights (Deep Text Semantics)	Topic Modeling	TopicsInterpretableAudit (Variant 5)	BERTopic (embedding + c-TF-IDF) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
81	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 6)	LDA (collapsed Gibbs / variational) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
82	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 7)	HDP (nonparametric) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
83	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 8)	CTM / STM (correlated / covariates) | Extension	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotato

				s: ablation, hyperparameter sweep, robustness checks			r agreement, Reproducibility
84	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 9)	Dynamic Topic Model (DTM) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
85	Topic Insights (Deep Text Semantics)	Topic Modeling	TopicsInterpretableAudit (Variant 10)	BERTopic (embedding + c-TF-IDF) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
86	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 11)	LDA (collapsed Gibbs / variational) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
87	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 12)	HDP (nonparametric) | Extensions: ablation,	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-

				hyperparameter sweep, robustness checks			annotator agreement, Reproducibility
88	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 13)	CTM / STM (correlated / covariates) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
89	Topic Insights (Deep Text Semantics)	Topic Modeling	Topics (Variant 14)	Dynamic Topic Model (DTM) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
90	Topic Insights (Deep Text Semantics)	Topic Modeling	TopicsInterpretableAudit (Variant 15)	BERTopic (embedding + c-TF-IDF) | Extensions: ablation, hyperparameter sweep, robustness checks	(Paragraph/)+Data (/)	TopicsDistribution, Topics, Topics,	Topic coherence(C_v), TopicsStability, Inter-annotator agreement, Reproducibility
91	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Model	Claims (Variant 1)	Argument mining (claim/premise) | Extensions:	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence

		ing		ablation, hyperparameter sweep, robustness checks			Coverage,
92	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Evidence Alignment (Variant 2)	Claim–evidence linking + retrieval | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
93	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Relations (Variant 3)	RST / discourse parsing | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
94	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Discourse Structure (Variant 4)	NLI-based support/contradiction graph | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
95	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Narrative (Variant 5)	Rhetorical device & framing detection | Extensions: ablation, hyperparameter	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,

				sweep, robustness checks			
96	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Claims (Variant 6)	Argument mining (claim/premise) | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
97	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Evidence Alignment (Variant 7)	Claim–evidence linking + retrieval | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
98	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Relations (Variant 8)	RST / discourse parsing | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
99	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Discourse Structure (Variant 9)	NLI-based support/contradiction graph | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,

100	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Narrative (Variant 10)	Rhetorical device & framing detection | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
101	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Claims (Variant 11)	Argument mining (claim/premise) | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
102	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Evidence Alignment (Variant 12)	Claim–evidence linking + retrieval | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
103	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Relations (Variant 13)	RST / discourse parsing | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
104	Discourse / Narrative-	Argumentation /	Discourse Structure (Variant	NLI-based support/contradictio	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradicti	Structure Consistency,

	Structure Insights	Rhetorical Modeling	14)	n graph | Extensions: ablation, hyperparameter sweep, robustness checks		on points, Narrative	Consistency(κ), Evidence Coverage,
105	Discourse / Narrative-Structure Insights	Argumentation / Rhetorical Modeling	Narrative (Variant 15)	Rhetorical device & framing detection | Extensions: ablation, hyperparameter sweep, robustness checks	Text+ParagraphStructure+Citations/Links	Graph, Evidence, Contradiction points, Narrative	Structure Consistency, Consistency(κ), Evidence Coverage,
106	Event Extraction & Timeline Insights	Information Extraction	(Variant 1)	NER (BiLSTM-CRF / Transformer) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
107	Event Extraction & Timeline Insights	Information Extraction	Relations (Variant 2)	Relation extraction (span/prompt) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
108	Event Extraction & Timeline	Information Extrac	(Variant 3)	Event extraction (trigger+argument) |	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence

	Insights	tion		Extensions: ablation, hyperparameter sweep, robustness checks			Alignment,
109	Event Extraction & Timeline Insights	Information Extraction	(Variant 4)	Temporal IE + time normalization | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
110	Event Extraction & Timeline Insights	Information Extraction	(Variant 5)	Event coreference resolution | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
111	Event Extraction & Timeline Insights	Information Extraction	(Variant 6)	NER (BiLSTM-CRF / Transformer) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
112	Event Extraction & Timeline	Information Extrac	Relations (Variant 7)	Relation extraction (span/prompt) |	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence

	Insights	tion		Extensions: ablation, hyperparameter sweep, robustness checks			Alignment,
113	Event Extraction & Timeline Insights	Information Extraction	(Variant 8)	Event extraction (trigger+argument) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
114	Event Extraction & Timeline Insights	Information Extraction	(Variant 9)	Temporal IE + time normalization | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
115	Event Extraction & Timeline Insights	Information Extraction	(Variant 10)	Event coreference resolution | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
116	Event Extraction & Timeline Insights	Information Extraction	(Variant 11)	NER (BiLSTM-CRF / Transformer) |	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignme

				Extensions: ablation, hyperparameter sweep, robustness checks			nt,
117	Event Extraction & Timeline Insights	Information Extraction	Relations (Variant 12)	Relation extraction (span/prompt) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
118	Event Extraction & Timeline Insights	Information Extraction	(Variant 13)	Event extraction (trigger+argument) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
119	Event Extraction & Timeline Insights	Information Extraction	(Variant 14)	Temporal IE + time normalization | Extensions: ablation, hyperparameter sweep, robustness checks	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,
120	Event Extraction & Timeline Insights	Information Extraction	(Variant 15)	Event coreference resolution | Extension	Text/OSINT	Graph, , CausalEvidenceTraceability	P/R/F1, Consistency, Evidence Alignment,

				s: ablation, hyperparameter sweep, robustness checks			
121	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 1)	STL decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
122	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 2)	State-space + Kalman filtering | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
123	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 3)	Bayesian Online Change Point Detection (BOCPD) | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
124	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 4)	Hidden Markov Models (regime switching)	/	--, ,	, Latency, Forecast error, Calibrati

				| Extensions: ablation, hyperparameter sweep, robustness checks			on
125	Trend / Cycle / Change-Point Insights	Time-Series Analysis	Insights (Variant 5)	Wavelet / spectral analysis | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
126	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 6)	STL decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
127	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 7)	State-space + Kalman filtering | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
128	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 8)	Bayesian Online Change Point Detection (BOCPD) |	/	--, ,	, Latency, Forecast error, Calibration

				Extensions: ablation, hyperparameter sweep, robustness checks			
129	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 9)	Hidden Markov Models (regime switching) | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
130	Trend / Cycle / Change-Point Insights	Time-Series Analysis	Insights (Variant 10)	Wavelet / spectral analysis | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
131	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 11)	STL decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
132	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 12)	State-space + Kalman filtering | Extensions:	/	--, ,	, Latency, Forecast error, Calibration

				ablation, hyperparameter sweep, robustness checks			
133	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 13)	Bayesian Online Change Point Detection (BOCPD) | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
134	Trend / Cycle / Change-Point Insights	Time-Series Analysis	(Variant 14)	Hidden Markov Models (regime switching) | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
135	Trend / Cycle / Change-Point Insights	Time-Series Analysis	Insights (Variant 15)	Wavelet / spectral analysis | Extensions: ablation, hyperparameter sweep, robustness checks	/	--, ,	, Latency, Forecast error, Calibration
136	Forecasting Insights (Point / Interval /	Predictive Modeling	(Variant 1)	ARIMA/ETS + diagnostics |	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PI

	Set)			Extensions: ablation, hyperparameter sweep, robustness checks			NAW, Calibration(ECE)
137	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 2)	Prophet / GAM-based forecasting | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
138	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 3)	GBDT (XGBoost/LightGBM) | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
139	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 4)	DeepAR / N-BEATS / TFT | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
140	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 5)	Quantile regression / distributional forecastin	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibrati

				g | Extensions: ablation, hyperparameter sweep, robustness checks			on(ECE)
141	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 6)	ARIMA/ETS + diagnostics | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
142	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 7)	Prophet / GAM-based forecasting | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
143	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 8)	GBDT (XGBoost /LightGBM) | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
144	Forecasting Insights (Point / Interval /	Predictive Modeling	(Variant 9)	DeepAR / N-BEATS / TFT | Extension	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PI

	Set)			s: ablation, hyperparameter sweep, robustness checks			NAW, Calibration(ECE)
145	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 10)	Quantile regression / distributional forecasting | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
146	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 11)	ARIMA/ETS + diagnostics | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
147	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 12)	Prophet / GAM-based forecasting | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
148	Forecasting Insights (Point /	Predictive Model	(Variant 13)	GBDT (XGBoost /LightGB	Time-series++	, Quantiles/ Distributio	MAE/RMSE, CRPS,

	Interval / Set)	ing		M) | Extensions: ablation, hyperparameter sweep, robustness checks		n, /Set,	PICP/PINAW, Calibration(ECE)
149	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 14)	DeepAR / N-BEATS / TFT | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
150	Forecasting Insights (Point / Interval / Set)	Predictive Modeling	(Variant 15)	Quantile regression / distributional forecasting | Extensions: ablation, hyperparameter sweep, robustness checks	Time-series++	, Quantiles/ Distribution, /Set,	MAE/RMSE, CRPS, PICP/PINAW, Calibration(ECE)
151	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 1)	Isolation Forest | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
152	Anomaly Insights (Rare Events / Fraud /	Anomaly Detection	Anomalies (Variant 2)	One-Class SVM | Extensions: ablation,	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable

	Attacks)			hyperparameter sweep, robustness checks			
153	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 3)	LOF / kNN density | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
154	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Root cause (Variant 4)	Autoencoder (reconstruction) | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
155	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	(Variant 5)	CUSUM/ EWMA for sequential anomaly | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
156	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 6)	Isolation Forest | Extensions: ablation, hyperparameter sweep, robustness	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable

				checks			
157	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 7)	One-Class SVM | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
158	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 8)	LOF / kNN density | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
159	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Root cause (Variant 9)	Autoencoder (reconstruction) | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
160	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	(Variant 10)	CUSUM/ EWMA for sequential anomaly | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
161	Anomaly Insights (Rare	Anomaly Detect	Anomalies (Variant 11)	Isolation Forest | Extension	/Logs//Metrics	Anomalies, , Root causeInterp	AUC-PR, /, Latency,

	Events / Fraud / Attacks)	ion		s: ablation, hyperparameter sweep, robustness checks		retation	Interpretable
162	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 12)	One-Class SVM | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
163	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Anomalies (Variant 13)	LOF / kNN density | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
164	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	Root cause (Variant 14)	Autoencoder (reconstruction) | Extensions: ablation, hyperparameter sweep, robustness checks	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable
165	Anomaly Insights (Rare Events / Fraud / Attacks)	Anomaly Detection	(Variant 15)	CUSUM/ EWMA for sequential anomaly | Extensions: ablation, hyperparameter	/Logs//Metrics	Anomalies, , Root causeInterpretation	AUC-PR, /, Latency, Interpretable

				sweep, robustness checks			
166	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 1)	Graph Autoencoder anomaly | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
167	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 2)	DOMINANT (GCN-based) | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
168	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	GraphAnomalies (Variant 3)	Subgraph scan statistics | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
169	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	(Variant 4)	Community drift detection | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
1	Structural	Graph	Anomalies	Temporal	RelationsNetwork/	Anomalies/	GraphInt

70	Anomaly Insights (Network / Graph)	Anomaly Detection	(Variant 5)	graph anomaly (TGNN) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/Graph	Graph, AnomaliesInterpretationEvidence	erpretable, Stability, TraceabilityEvidence,
171	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 6)	Graph Autoencoder anomaly | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
172	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 7)	DOMINANT (GCN-based) | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
173	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	GraphAnomalies (Variant 8)	Subgraph scan statistics | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
174	Structural Anomaly Insights (Network	Graph Anomaly Detect	(Variant 9)	Community drift detection | Extension	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretatio	GraphInterpretable, Stability,

	/ Graph)	ion		s: ablation, hyperparameter sweep, robustness checks		nEvidence	TraceabilityEvidence,
175	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 10)	Temporal graph anomaly (TGNN) | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
176	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 11)	Graph Autoencoder anomaly | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
177	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 12)	DOMINANT (GCN-based) | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
178	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	GraphAnomalies (Variant 13)	Subgraph scan statistics | Extensions: ablation, hyperpara	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,

				meter sweep, robustness checks			
179	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	(Variant 14)	Community drift detection | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
180	Structural Anomaly Insights (Network / Graph)	Graph Anomaly Detection	Anomalies (Variant 15)	Temporal graph anomaly (TGNN) | Extensions: ablation, hyperparameter sweep, robustness checks	RelationsNetwork/ Knowledge Graph/Graph	Anomalies/ Graph, AnomaliesInterpretationEvidence	GraphInterpretable, Stability, TraceabilityEvidence,
181	CausalInsights (Interpretation)	CausalInference	(ATE) (Variant 1)	SCM/DAG + do-calculus reasoning | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
182	CausalInsights (Interpretation)	CausalInference	(CATE) (Variant 2)	Double Machine Learning (DML) | Extensions: ablation, hyperparameter sweep,	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,

				robustness checks			
183	CausalInsights (Interpretation)	CausalInference	Mechanism/ (Variant 3)	Instrumental Variables (IV) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
184	CausalInsights (Interpretation)	CausalInference	Evaluation (Variant 4)	RDD / DiD / Synthetic Control | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
185	CausalInsights (Interpretation)	CausalInference	Robust (Variant 5)	Sensitivity analysis (Rosenbaum/E-value) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
186	CausalInsights (Interpretation)	CausalInference	(ATE) (Variant 6)	SCM/DAG + do-calculus reasoning | Extensions: ablation, hyperparameter sweep,	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,

				robustness checks			
187	CausalInsights (Interpretation)	CausalInference	(CATE) (Variant 7)	Double Machine Learning (DML) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
188	CausalInsights (Interpretation)	CausalInference	Mechanism/ (Variant 8)	Instrumental Variables (IV) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
189	CausalInsights (Interpretation)	CausalInference	Evaluation (Variant 9)	RDD / DiD / Synthetic Control | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
190	CausalInsights (Interpretation)	CausalInference	Robust (Variant 10)	Sensitivity analysis (Rosenbaum/E-value) | Extensions: ablation, hyperparameter sweep, robustness	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,

				checks			
191	CausalInsights (Interpretation)	CausalInference	(ATE) (Variant 11)	SCM/DAG + do-calculus reasoning | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
192	CausalInsights (Interpretation)	CausalInference	(CATE) (Variant 12)	Double Machine Learning (DML) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
193	CausalInsights (Interpretation)	CausalInference	Mechanism/ (Variant 13)	Instrumental Variables (IV) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
194	CausalInsights (Interpretation)	CausalInference	Evaluation (Variant 14)	RDD / DiD / Synthetic Control | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,

195	CausalInsights (Interpretation)	CausalInference	Robust (Variant 15)	Sensitivity analysis (Rosenbaum/E-value) | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Quasi-experiment/Data+	Causal, Mechanism,	, , ,
196	Mechanism (DataCausalStructure)	Causal	Constraints (Variant 1)	PC / FCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
197	Mechanism (DataCausalStructure)	Causal	(Variant 2)	GES / score-based search | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
198	Mechanism (DataCausalStructure)	Causal	Causal (Variant 3)	LiNGAM / ANM | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
199	Mechanism (DataCausalStructure)	Causal	Structure (Variant 4)	NOTEARS / DAG-GNN | Extensions: ablation,	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpret

				hyperparameter sweep, robustness checks			able
200	Mechanism (DataCausalStructure)	Causal	Time-seriesCausal (Variant 5)	Granger causality / PCMCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
201	Mechanism (DataCausalStructure)	Causal	Constraints (Variant 6)	PC / FCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
202	Mechanism (DataCausalStructure)	Causal	(Variant 7)	GES / score-based search | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
203	Mechanism (DataCausalStructure)	Causal	Causal (Variant 8)	LiNGAM / ANM | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
204	Mechanism (DataCaus	Causal	Structure (Variant 9)	NOTEARS / DAG-GNN |	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap),

	alStructure)			Extensions: ablation, hyperparameter sweep, robustness checks			Validation, , Interpretable
205	Mechanism (DataCausalStructure)	Causal	Time-seriesCausal (Variant 10)	Granger causality / PCMCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
206	Mechanism (DataCausalStructure)	Causal	Constraints (Variant 11)	PC / FCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
207	Mechanism (DataCausalStructure)	Causal	(Variant 12)	GES / score-based search | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
208	Mechanism (DataCausalStructure)	Causal	Causal (Variant 13)	LiNGAM / ANM | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable

209	Mechanism (DataCausalStructure)	Causal	Structure (Variant 14)	NOTEARS / DAG-GNN | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
210	Mechanism (DataCausalStructure)	Causal	Time-seriesCausal (Variant 15)	Granger causality / PCMCI | Extensions: ablation, hyperparameter sweep, robustness checks	Observations/Time-seriesData	CausalGraph, Edge confidence,	Stability(bootstrap), Validation, , Interpretable
211	Insights (…)		(Variant 1)	Counterfactual regression (CFR) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
212	Insights (…)		(Variant 2)	CFRNet / TARNet-style | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
213	Insights (…)		Constraints (Variant 3)	GAN-CF (counterfactual GAN) | Extension	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpret

				s: ablation, hyperparameter sweep, robustness checks			able,
214	Insights (…)		(Variant 4)	Diffusion-based counterfactuals | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
215	Insights (…)		(Variant 5)	Actionable CF with constraints (immutable features) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
216	Insights (…)		(Variant 6)	Counterfactual regression (CFR) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
217	Insights (…)		(Variant 7)	CFRNet / TARNet-style | Extension	/Samples+Constraints	Samples, ,	Feasibility, , Constraints,

				s: ablation, hyperparameter sweep, robustness checks			Interpretable,
218	Insights (…)		Constraints (Variant 8)	GAN-CF (counterfactual GAN) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
219	Insights (…)		(Variant 9)	Diffusion-based counterfactuals | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
220	Insights (…)		(Variant 10)	Actionable CF with constraints (immutable features) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
221	Insights (…)		(Variant 11)	Counterfactual regression (CFR) |	/Samples+Constraints	Samples, ,	Feasibility, , Constraints,

				Extensions: ablation, hyperparameter sweep, robustness checks			Interpretable,
222	Insights (…)		(Variant 12)	CFRNet / TARNet-style | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
223	Insights (…)		Constraints (Variant 13)	GAN-CF (counterfactual GAN) | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
224	Insights (…)		(Variant 14)	Diffusion-based counterfactuals | Extensions: ablation, hyperparameter sweep, robustness checks	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,
225	Insights (…)		(Variant 15)	Actionable CF with constraints (immutable features) |	/Samples+Constraints	Samples, ,	Feasibility, , Constraints, Interpretable,

				Extensions: ablation, hyperparameter sweep, robustness checks			
226	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 1)	SHAP (TreeSHAP/KernelSHAP) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
227	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 2)	LIME / Anchors | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
228	InterpretationInsights (Model)	InterpretableAI	RulesInterpretation (Variant 3)	Integrated Gradients | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
229	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 4)	Counterfactual explanations | Extensions: ablation, hyperparameter	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement

				sweep, robustness checks			
230	InterpretationInsights (Model)	InterpretableAI	CausalInterpretation (Variant 5)	Concept-based explanation (TCAV) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
231	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 6)	SHAP (TreeSHAP/KernelSHAP) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
232	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 7)	LIME / Anchors | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
233	InterpretationInsights (Model)	InterpretableAI	RulesInterpretation (Variant 8)	Integrated Gradients | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
2	Interpretat	Interp	Interpretat	Counterfa	Model+Samples+	, Rules, ,	Faithfuln

34	ionInsights (Model)	retableAI	ion (Variant 9)	ctual explanations | Extensions: ablation, hyperparameter sweep, robustness checks			ess, Stability, , Inter-annotator agreement
235	InterpretationInsights (Model)	InterpretableAI	CausalInterpretation (Variant 10)	Concept-based explanation (TCAV) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
236	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 11)	SHAP (TreeSHAP/KernelSHAP) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
237	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 12)	LIME / Anchors | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
238	InterpretationInsights (Model)	InterpretableAI	RulesInterpretation (Variant 13)	Integrated Gradients | Extension	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-

				s: ablation, hyperparameter sweep, robustness checks			annotator agreement
239	InterpretationInsights (Model)	InterpretableAI	Interpretation (Variant 14)	Counterfactual explanations | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
240	InterpretationInsights (Model)	InterpretableAI	CausalInterpretation (Variant 15)	Concept-based explanation (TCAV) | Extensions: ablation, hyperparameter sweep, robustness checks	Model+Samples+	, Rules, ,	Faithfulness, Stability, , Inter-annotator agreement
241	Rules/Insights		Rules (Variant 1)	Datalog / forward-chaining | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
242	Rules/Insights		Consistency (Variant 2)	Description Logic reasoners | Extensions: ablation, hyperpara	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs

				meter sweep, robustness checks			
243	Rules/Insights		Constraints (Variant 3)	Answer Set Programming (ASP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
244	Rules/Insights		(Variant 4)	Constraint programming (CSP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
245	Rules/Insights		Audit (Variant 5)	Rule learning (AMIE/ILP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
246	Rules/Insights		Rules (Variant 6)	Datalog / forward-chaining | Extensions: ablation, hyperparameter sweep,	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs

				robustness checks			
247	Rules/Insights		Consistency (Variant 7)	Description Logic reasoners | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
248	Rules/Insights		Constraints (Variant 8)	Answer Set Programming (ASP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
249	Rules/Insights		(Variant 9)	Constraint programming (CSP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
250	Rules/Insights		Audit (Variant 10)	Rule learning (AMIE/ILP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs

251	Rules/Insights		Rules (Variant 11)	Datalog / forward-chaining | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
252	Rules/Insights		Consistency (Variant 12)	Description Logic reasoners | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
253	Rules/Insights		Constraints (Variant 13)	Answer Set Programming (ASP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
254	Rules/Insights		(Variant 14)	Constraint programming (CSP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Rules/+	, ,	, Coverage, RulesCoverage, AuditLogs
255	Rules/Insights		Audit (Variant 15)	Rule learning (AMIE/IL	+Rules/+	, ,	, Coverage,

				P) | Extensions: ablation, hyperparameter sweep, robustness checks			RulesCoverage, AuditLogs
256	Evidence Consistency/Insights		Evidence (Variant 1)	Evidence retrieval (BM25 + dense) | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
257	Evidence Consistency/Insights		/ (Variant 2)	NLI/RTE support-contradiction classification | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
258	Evidence Consistency/Insights		Evidence (Variant 3)	Claim verification pipelines | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
259	Evidence Consistency/Insight		(Variant 4)	Consistency regularizat	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points,	Evidence Coverage, ,

	s			ion / constraints | Extensions: ablation, hyperparameter sweep, robustness checks		EvidenceAudit	Calibration, Audit
260	Evidence Consistency/Insights		(Variant 5)	Cross-modal consistency (chart/image-text) | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
261	Evidence Consistency/Insights		Evidence (Variant 6)	Evidence retrieval (BM25 + dense) | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
262	Evidence Consistency/Insights		/ (Variant 7)	NLI/RTE support-contradiction classification | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit

263	Evidence Consistency/Insights		Evidence (Variant 8)	Claim verification pipelines | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
264	Evidence Consistency/Insights		(Variant 9)	Consistency regularization / constraints | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
265	Evidence Consistency/Insights		(Variant 10)	Cross-modal consistency (chart/image-text) | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
266	Evidence Consistency/Insights		Evidence (Variant 11)	Evidence retrieval (BM25 + dense) | Extensions: ablation, hyperparameter sweep, robustness	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit

				checks			
267	Evidence Consistency/Insights		/ (Variant 12)	NLI/RTE support-contradiction classification | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
268	Evidence Consistency/Insights		Evidence (Variant 13)	Claim verification pipelines | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
269	Evidence Consistency/Insights		(Variant 14)	Consistency regularization / constraints | Extensions: ablation, hyperparameter sweep, robustness checks	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit
270	Evidence Consistency/Insights		(Variant 15)	Cross-modal consistency (chart/image-text) | Extensions: ablation,	ClaimsText+Evidence+Citations/Links+Graph/Graph	, Contradiction points, EvidenceAudit	Evidence Coverage, , Calibration, Audit

				hyperparameter sweep, robustness checks			
271	Insights (/Set)	Calibration	(Variant 1)	Conformal prediction (split/cv+) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
272	Insights (/Set)	Calibration	(Variant 2)	Bayesian posterior (VI/MCMC) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
273	Insights (/Set)	Calibration	Risk (Variant 3)	Quantile regression | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
274	Insights (/Set)	Calibration	Set (Variant 4)	Ensemble uncertainty (deep ensembles) | Extensions: ablation, hyperpara	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,

				meter sweep, robustness checks			
275	Insights (/Set)	Calibration	Calibration (Variant 5)	Calibration (Platt/Isotonic/Temp scaling) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
276	Insights (/Set)	Calibration	(Variant 6)	Conformal prediction (split/cv+) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
277	Insights (/Set)	Calibration	(Variant 7)	Bayesian posterior (VI/MCMC) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
278	Insights (/Set)	Calibration	Risk (Variant 8)	Quantile regression | Extensions: ablation, hyperpara	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,

				meter sweep, robustness checks			
279	Insights (/Set)	Calibration	Set (Variant 9)	Ensemble uncertainty (deep ensembles) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
280	Insights (/Set)	Calibration	Calibration (Variant 10)	Calibration (Platt/Isotonic/Temp scaling) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
281	Insights (/Set)	Calibration	(Variant 11)	Conformal prediction (split/cv+) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
282	Insights (/Set)	Calibration	(Variant 12)	Bayesian posterior (VI/MCMC) | Extensions:	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,

				ablation, hyperparameter sweep, robustness checks			
283	Insights (/Set)	Calibration	Risk (Variant 13)	Quantile regression | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
284	Insights (/Set)	Calibration	Set (Variant 14)	Ensemble uncertainty (deep ensembles) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
285	Insights (/Set)	Calibration	Calibration (Variant 15)	Calibration (Platt/Isotonic/Temp scaling) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Calibration/	Confidence interval/Set, , Risk-	Coverage, , ECE, Risk,
286	RobustInsights (/)	Robust	Distribution (Variant 1)	DRO (Wasserstein / f-divergence) | Extension	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,

				s: ablation, hyperparameter sweep, robustness checks			
287	RobustInsights (/)	Robust	Causal (Variant 2)	IRM / invariant risk minimization | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
288	RobustInsights (/)	Robust	(Variant 3)	Group DRO / worst-group optimization | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
289	RobustInsights (/)	Robust	(Variant 4)	Adversarial training (FGSM/PGD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
290	RobustInsights (/)	Robust	OOD (Variant 5)	OOD detection (energy/ODIN) |	Data//	RobustModel, , Risk	worst-case, OOD AUC,

				Extensions: ablation, hyperparameter sweep, robustness checks			Stability,
291	RobustInsights (/)	Robust	Distribution (Variant 6)	DRO (Wasserstein / f-divergence) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
292	RobustInsights (/)	Robust	Causal (Variant 7)	IRM / invariant risk minimization | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
293	RobustInsights (/)	Robust	(Variant 8)	Group DRO / worst-group optimization | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
29	RobustInsights (/)	Robust	(Variant 9)	Adversarial training	Data//	RobustModel, , Risk	worst-case,

4				(FGSM/PGD) | Extensions: ablation, hyperparameter sweep, robustness checks			OOD AUC, Stability,
295	RobustInsights (/)	Robust	OOD (Variant 10)	OOD detection (energy/ODIN) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
296	RobustInsights (/)	Robust	Distribution (Variant 11)	DRO (Wasserstein / f-divergence) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
297	RobustInsights (/)	Robust	Causal (Variant 12)	IRM / invariant risk minimization | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
29	RobustInsights (/)	Robust	(Variant 13)	Group DRO /	Data//	RobustModel, , Risk	worst-case,

8				worst-group optimization | Extensions: ablation, hyperparameter sweep, robustness checks			OOD AUC, Stability,
299	RobustInsights (/)	Robust	(Variant 14)	Adversarial training (FGSM/PGD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
300	RobustInsights (/)	Robust	OOD (Variant 15)	OOD detection (energy/ODIN) | Extensions: ablation, hyperparameter sweep, robustness checks	Data//	RobustModel, , Risk	worst-case, OOD AUC, Stability,
301	Insights ()		Text (Variant 1)	Word2Vec/Doc2Vec | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
302	Insights ()		Comparison (Variant 2)	Transformer embeddin	Text/	, , Graph	Recall@k/MRR, Clusterin

				gs (BERT/SBERT) | Extensions: ablation, hyperparameter sweep, robustness checks			gStability, ComparisonConsistency
303	Insights ()		(Variant 3)	Contrastive learning (SimCSE) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
304	Insights ()		(Variant 4)	Siamese / triplet loss | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
305	Insights ()		Clustering (Variant 5)	RAG embeddings + re-ranking | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
306	Insights ()		Text (Variant 6)	Word2Vec/Doc2Vec | Extension	Text/	, , Graph	Recall@k/MRR, ClusteringStabilit

				s: ablation, hyperparameter sweep, robustness checks			y, ComparisonConsistency
307	Insights ()		Comparison (Variant 7)	Transformer embeddings (BERT/SBERT) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
308	Insights ()		(Variant 8)	Contrastive learning (SimCSE) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
309	Insights ()		(Variant 9)	Siamese / triplet loss | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
310	Insights ()		Clustering (Variant 10)	RAG embeddings + re-ranking | Extensions:	Text/	, , Graph	Recall@k/MRR, ClusteringStability, Compari

				ablation, hyperparameter sweep, robustness checks			sonConsistency
311	Insights ()		Text (Variant 11)	Word2Vec/Doc2Vec | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
312	Insights ()		Comparison (Variant 12)	Transformer embeddings (BERT/SBERT) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
313	Insights ()		(Variant 13)	Contrastive learning (SimCSE) | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
314	Insights ()		(Variant 14)	Siamese / triplet loss | Extensions: ablation, hyperpara	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsi

				meter sweep, robustness checks			stency
315	Insights ()		Clustering (Variant 15)	RAG embeddings + re-ranking | Extensions: ablation, hyperparameter sweep, robustness checks	Text/	, , Graph	Recall@k/MRR, ClusteringStability, ComparisonConsistency
316	GraphInsights (— Relations — Mechanism)	Graph/Knowledge Graph	(Variant 1)	GCN/GAT/GraphSAGE | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
317	GraphInsights (— Relations — Mechanism)	Graph/Knowledge Graph	(Variant 2)	R-GCN / HGT (heterogeneous) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
318	GraphInsights (— Relations — Mechanism)	Graph/Knowledge Graph	Interpretation (Variant 3)	KG embeddings (TransE/RotatE/ComplEx) | Extensions: ablation, hyperparameter	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,

				sweep, robustness checks			
319	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	Graph (Variant 4)	Path-based reasoning (PRA/Neural LP) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
320	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	KGConsistencyAudit (Variant 5)	Graph explainers (GNNExplainer/PGExplainer) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
321	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	(Variant 6)	GCN/GAT/GraphSAGE | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
322	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	(Variant 7)	R-GCN / HGT (heterogeneous) | Extensions: ablation, hyperparameter	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,

				sweep, robustness checks			
323	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	Interpretation (Variant 8)	KG embeddings (TransE/RotatE/ComplEx) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
324	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	Graph (Variant 9)	Path-based reasoning (PRA/Neural LP) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
325	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	KGConsistencyAudit (Variant 10)	Graph explainers (GNNExplainer/PGExplainer) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
326	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	(Variant 11)	GCN/GAT/GraphSAGE | Extensions: ablation,	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence

				hyperparameter sweep, robustness checks			,
327	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	(Variant 12)	R-GCN / HGT (heterogeneous) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
328	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	Interpretation (Variant 13)	KG embeddings (TransE/RotatE/ComplEx) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
329	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	Graph (Variant 14)	Path-based reasoning (PRA/Neural LP) | Extensions: ablation, hyperparameter sweep, robustness checks	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence,
330	GraphInsights (—Relations—Mechanism)	Graph/Knowledge Graph	KGConsistencyAudit (Variant 15)	Graph explainers (GNNExplainer/PGExplainer) |	Knowledge Graph/RelationsGraph++TextEvidence	/, Relations, InterpretationGraph, Mechanism	MRR/Hits@k, InterpretationFaithfulness, Evidence

				Extensions: ablation, hyperparameter sweep, robustness checks			,
331	/Insights (/Network)	Model	(Variant 1)	SIR/SEIR compartment models | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
332	/Insights (/Network)	Model	(Variant 2)	Hawkes processes | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
333	/Insights (/Network)	Model	(Variant 3)	Independent Cascade / Linear Threshold | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
334	/Insights (/Network)	Model	(Variant 4)	Influence maximization (CELF/IMM) | Extension	/Network/	, ,	Forecast error, , , Robust

				s: ablation, hyperparameter sweep, robustness checks			
335	/Insights (/Network)	Model	/ (Variant 5)	Rumor detection + diffusion features | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
336	/Insights (/Network)	Model	(Variant 6)	SIR/SEIR compartment models | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
337	/Insights (/Network)	Model	(Variant 7)	Hawkes processes | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
338	/Insights (/Network)	Model	(Variant 8)	Independent Cascade / Linear Threshold | Extensions:	/Network/	, ,	Forecast error, , , Robust

				ablation, hyperparameter sweep, robustness checks			
339	/Insights (/Network)	Model	(Variant 9)	Influence maximization (CELF/IMM) | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
340	/Insights (/Network)	Model	/ (Variant 10)	Rumor detection + diffusion features | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
341	/Insights (/Network)	Model	(Variant 11)	SIR/SEIR compartment models | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
342	/Insights (/Network)	Model	(Variant 12)	Hawkes processes | Extensions: ablation, hyperpara	/Network/	, ,	Forecast error, , , Robust

				meter sweep, robustness checks			
343	/Insights (/Network)	Model	(Variant 13)	Independent Cascade / Linear Threshold | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
344	/Insights (/Network)	Model	(Variant 14)	Influence maximization (CELF/IMM) | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
345	/Insights (/Network)	Model	/ (Variant 15)	Rumor detection + diffusion features | Extensions: ablation, hyperparameter sweep, robustness checks	/Network/	, ,	Forecast error, , , Robust
346	Insights ()	/	(Variant 1)	System Dynamics (stock-flow) | Extensions:	Mechanism++ObservationsData	Structure, , Risk	Structure , , , Reproducibility

				ablation, hyperparameter sweep, robustness checks			
347	Insights ()	/	(Variant 2)	Agent-based modeling (ABM) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
348	Insights ()	/	(Variant 3)	Lotka–Volterra / replicator dynamics | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
349	Insights ()	/	(Variant 4)	Network dynamics (SI on graphs) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
350	Insights ()	/	(Variant 5)	Global sensitivity (Sobol/Morris) | Extensions: ablation, hyperpara	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility

				meter sweep, robustness checks			
351	Insights ()	/	(Variant 6)	System Dynamics (stock-flow) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , , Reproducibility
352	Insights ()	/	(Variant 7)	Agent-based modeling (ABM) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , , Reproducibility
353	Insights ()	/	(Variant 8)	Lotka–Volterra / replicator dynamics | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , , Reproducibility
354	Insights ()	/	(Variant 9)	Network dynamics (SI on graphs) | Extensions: ablation, hyperparameter sweep,	Mechanism++ObservationsData	Structure, , Risk	Structure, , , , Reproducibility

				robustness checks			
355	Insights ()	/	(Variant 10)	Global sensitivity (Sobol/Morris) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
356	Insights ()	/	(Variant 11)	System Dynamics (stock-flow) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
357	Insights ()	/	(Variant 12)	Agent-based modeling (ABM) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
358	Insights ()	/	(Variant 13)	Lotka–Volterra / replicator dynamics | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility

359	Insights ()	/	(Variant 14)	Network dynamics (SI on graphs) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
360	Insights ()	/	(Variant 15)	Global sensitivity (Sobol/Morris) | Extensions: ablation, hyperparameter sweep, robustness checks	Mechanism++ObservationsData	Structure, , Risk	Structure, , , Reproducibility
361	Insights ()		(Variant 1)	LP/QP | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
362	Insights ()		/ (Variant 2)	Mixed-Integer Programming (MIP) | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
363	Insights ()		RiskConstraints (Variant 3)	Stochastic programming | Extension	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,

				s: ablation, hyperparameter sweep, robustness checks			
364	Insights ()		(Variant 4)	Robust optimization | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
365	Insights ()		(Variant 5)	Multi-objective (Pareto/ε-constraint) | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
366	Insights ()		(Variant 6)	LP/QP | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
367	Insights ()		/ (Variant 7)	Mixed-Integer Programming (MIP) | Extensions: ablation, hyperparameter	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,

				sweep, robustness checks			
368	Insights ()		RiskConstraints (Variant 8)	Stochastic programming | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
369	Insights ()		(Variant 9)	Robust optimization | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
370	Insights ()		(Variant 10)	Multi-objective (Pareto/ε-constraint) | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
371	Insights ()		(Variant 11)	LP/QP | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
372	Insights ()		/ (Variant 12)	Mixed-Integer Programm	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,

				ing (MIP) | Extensions: ablation, hyperparameter sweep, robustness checks			
373	Insights ()		RiskConstraints (Variant 13)	Stochastic programming | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
374	Insights ()		(Variant 14)	Robust optimization | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
375	Insights ()		(Variant 15)	Multi-objective (Pareto/ε-constraint) | Extensions: ablation, hyperparameter sweep, robustness checks	+Constraints+/Risk	, , , Comparison	Feasibility, Gap, ,
376	Insights ()		(Variant 1)	Q-learning / DQN | Extensions:	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust

				ablation, hyperparameter sweep, robustness checks			
377	Insights ()		(Variant 2)	Policy Gradient / PPO | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
378	Insights ()		Constraints (Variant 3)	Actor-Critic (A2C/SAC) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
379	Insights ()		(Variant 4)	Offline RL (CQL/IQL) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
380	Insights ()		InterpretableRL (Variant 5)	Safe RL (constrained RL, Lagrangian) | Extensions: ablation, hyperpara	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust

				meter sweep, robustness checks			
381	Insights ()		(Variant 6)	Q-learning / DQN | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
382	Insights ()		(Variant 7)	Policy Gradient / PPO | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
383	Insights ()		Constraints (Variant 8)	Actor-Critic (A2C/SAC) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
384	Insights ()		(Variant 9)	Offline RL (CQL/IQL) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust

385	Insights ()		InterpretableRL (Variant 10)	Safe RL (constrained RL, Lagrangian) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
386	Insights ()		(Variant 11)	Q-learning / DQN | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
387	Insights ()		(Variant 12)	Policy Gradient / PPO | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
388	Insights ()		Constraints (Variant 13)	Actor-Critic (A2C/SAC) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
389	Insights ()		(Variant 14)	Offline RL (CQL/IQL	//Logs	, , RiskConstraintsInterpr	, Constraints,

				) | Extensions: ablation, hyperparameter sweep, robustness checks		etation	OPE, Robust
390	Insights ()		InterpretableRL (Variant 15)	Safe RL (constrained RL, Lagrangian) | Extensions: ablation, hyperparameter sweep, robustness checks	//Logs	, , RiskConstraintsInterpretation	, Constraints, OPE, Robust
391	Insights ()	Model	Data (Variant 1)	VAE / CVAE | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
392	Insights ()	Model	(Variant 2)	GAN / CTGAN | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
393	Insights ()	Model	Data (Variant 3)	Diffusion models | Extensions: ablation, hyperparameter sweep,	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /

				robustness checks			
394	Insights ()	Model	Mechanism (Variant 4)	Normalizing flows | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
395	Insights ()	Model	(Variant 5)	DP generative modeling (ε-DP) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
396	Insights ()	Model	Data (Variant 6)	VAE / CVAE | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
397	Insights ()	Model	(Variant 7)	GAN / CTGAN | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
398	Insights ()	Model	Data (Variant 8)	Diffusion models | Extensions: ablation, hyperpara	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /

				meter sweep, robustness checks			
399	Insights ()	Model	Mechanism (Variant 9)	Normalizing flows | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
400	Insights ()	Model	(Variant 10)	DP generative modeling (ε-DP) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
401	Insights ()	Model	Data (Variant 11)	VAE / CVAE | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
402	Insights ()	Model	(Variant 12)	GAN / CTGAN | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
403	Insights ()	Model	Data (Variant 13)	Diffusion models | Extensions:	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /

				ablation, hyperparameter sweep, robustness checks			
404	Insights ()	Model	Mechanism (Variant 14)	Normalizing flows | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
405	Insights ()	Model	(Variant 15)	DP generative modeling (ε-DP) | Extensions: ablation, hyperparameter sweep, robustness checks	Samples++Constraints	Data, Mechanism Samples,	Statistics Consistency, , Risk, /
406	Insights (Graph+Text+Graph)	Alignment	(Variant 1)	CLIP-style contrastive alignment | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
407	Insights (Graph+Text+Graph)	Alignment	ConsistencyEvaluation (Variant 2)	Cross-attention fusion (ViT+Transformer) | Extensions:	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/

				ablation, hyperparameter sweep, robustness checks			
408	Insights (Graph+Text+Graph)	Alignment	(Variant 3)	Chart understanding (ResNet/ViT + OCR-free cues) | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
409	Insights (Graph+Text+Graph)	Alignment	(Variant 4)	Knowledge distillation for deployment | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
410	Insights (Graph+Text+Graph)	Alignment	Alignment (Variant 5)	Consistency regularization constraints | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
4	Insights	Align	(Variant	CLIP-	Graph/Graph+Tex	Alignment	Alignme

11	(Graph+Text+Graph)	ment	6)	style contrastive alignment | Extensions: ablation, hyperparameter sweep, robustness checks	tParagraph+Data	Evidence, Consistency, Interpretation	nt, @k, , Latency/
412	Insights (Graph+Text+Graph)	Alignment	ConsistencyEvaluation (Variant 7)	Cross-attention fusion (ViT+Transformer) | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
413	Insights (Graph+Text+Graph)	Alignment	(Variant 8)	Chart understanding (ResNet/ViT + OCR-free cues) | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
414	Insights (Graph+Text+Graph)	Alignment	(Variant 9)	Knowledge distillation for deployment | Extensions: ablation,	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/

				hyperparameter sweep, robustness checks			
415	Insights (Graph+Text+Graph)	Alignment	Alignment (Variant 10)	Consistency regularization constraints | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
416	Insights (Graph+Text+Graph)	Alignment	(Variant 11)	CLIP-style contrastive alignment | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
417	Insights (Graph+Text+Graph)	Alignment	ConsistencyEvaluation (Variant 12)	Cross-attention fusion (ViT+Transformer) | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
418	Insights (Graph+Text+Graph	Alignment	(Variant 13)	Chart understanding	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistenc	Alignment, @k, , Latency/

	)			(ResNet/ViT + OCR-free cues) | Extensions: ablation, hyperparameter sweep, robustness checks		y, Interpretation	
419	Insights (Graph+Text+Graph)	Alignment	(Variant 14)	Knowledge distillation for deployment | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
420	Insights (Graph+Text+Graph)	Alignment	Alignment (Variant 15)	Consistency regularization constraints | Extensions: ablation, hyperparameter sweep, robustness checks	Graph/Graph+TextParagraph+Data	Alignment Evidence, Consistency, Interpretation	Alignment, @k, , Latency/
421	Structure Alignment Insights (Data)	Alignment/ OT	DistributionAlignment (Variant 1)	Optimal Transport (OT) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules

422	Structure Alignment Insights (Data)	Alignment/ OT	StructureAlignment (Variant 2)	Gromov-Wasserstein / FGW | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment,, InterpretationRules	OT, Structure, Alignment, AuditRules
423	Structure Alignment Insights (Data)	Alignment/ OT	(Variant 3)	Graph matching (FAQ/Umeyama) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment,, InterpretationRules	OT, Structure, Alignment, AuditRules
424	Structure Alignment Insights (Data)	Alignment/ OT	schemaAlignment (Variant 4)	Schema alignment + constraints | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment,, InterpretationRules	OT, Structure, Alignment, AuditRules
425	Structure Alignment Insights (Data)	Alignment/ OT	Graph (Variant 5)	Domain adaptation (CORAL/ MMD) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment,, InterpretationRules	OT, Structure, Alignment, AuditRules
42	Structure Alignment	Alignment/	DistributionAlignme	Optimal Transport	Distribution/Structure/Graph/schema	Alignment,,	OT, Structure

6	Insights (Data)	OT	nt (Variant 6)	(OT) | Extensions: ablation, hyperparameter sweep, robustness checks		InterpretationRules	, Alignment, AuditRules
427	Structure Alignment Insights (Data)	Alignment/ OT	StructureAlignment (Variant 7)	Gromov-Wasserstein / FGW | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
428	Structure Alignment Insights (Data)	Alignment/ OT	(Variant 8)	Graph matching (FAQ/Umeyama) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
429	Structure Alignment Insights (Data)	Alignment/ OT	schemaAlignment (Variant 9)	Schema alignment + constraints | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
430	Structure Alignment Insights (Data)	Alignment/ OT	Graph (Variant 10)	Domain adaptation (CORAL/ MMD) | Extension	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment,

				s: ablation, hyperparameter sweep, robustness checks			AuditRules
431	Structure Alignment Insights (Data)	Alignment/ OT	DistributionAlignment (Variant 11)	Optimal Transport (OT) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
432	Structure Alignment Insights (Data)	Alignment/ OT	StructureAlignment (Variant 12)	Gromov-Wasserstein / FGW | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
433	Structure Alignment Insights (Data)	Alignment/ OT	(Variant 13)	Graph matching (FAQ/Umeyama) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
434	Structure Alignment Insights (Data)	Alignment/ OT	schemaAlignment (Variant 14)	Schema alignment + constraints | Extensions: ablation, hyperpara	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules

				meter sweep, robustness checks			
435	Structure Alignment Insights (Data)	Alignment/ OT	Graph (Variant 15)	Domain adaptation (CORAL/ MMD) | Extensions: ablation, hyperparameter sweep, robustness checks	Distribution/Structure/Graph/schema	Alignment, , InterpretationRules	OT, Structure, Alignment, AuditRules
436	Insights (Risk)		Thresholds (Variant 1)	Shewhart control charts | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
437	Insights (Risk)		(Variant 2)	EWMA / CUSUM | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
438	Insights (Risk)		(Variant 3)	Sequential probability ratio test (SPRT) | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
4	Insights		Metrics	Bayesian	Metrics//	Thresholds,	Latency,

39	(Risk)		(Variant 4)	sequential detection | Extensions: ablation, hyperparameter sweep, robustness checks		,	, Metrics, Interpretable
440	Insights (Risk)		(Variant 5)	Risk scoring + escalation policy | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
441	Insights (Risk)		Thresholds (Variant 6)	Shewhart control charts | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
442	Insights (Risk)		(Variant 7)	EWMA / CUSUM | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
443	Insights (Risk)		(Variant 8)	Sequential probability ratio test (SPRT) | Extensions: ablation,	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable

				hyperparameter sweep, robustness checks			
444	Insights (Risk)		Metrics (Variant 9)	Bayesian sequential detection | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
445	Insights (Risk)		(Variant 10)	Risk scoring + escalation policy | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
446	Insights (Risk)		Thresholds (Variant 11)	Shewhart control charts | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
447	Insights (Risk)		(Variant 12)	EWMA / CUSUM | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
4	Insights		(Variant	Sequential	Metrics//	Thresholds,	Latency,

48	(Risk)		13)	probability ratio test (SPRT) | Extensions: ablation, hyperparameter sweep, robustness checks		,	, Metrics, Interpretable
449	Insights (Risk)		Metrics (Variant 14)	Bayesian sequential detection | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
450	Insights (Risk)		(Variant 15)	Risk scoring + escalation policy | Extensions: ablation, hyperparameter sweep, robustness checks	Metrics//	Thresholds, ,	Latency, , Metrics, Interpretable
451	AuditInsights (Data/Evidence)	Data	Audit (Variant 1)	Missingness analysis (MCAR/MAR/MNAR) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
452	AuditInsights (Data/Evi	Data	ConsistencyAudit (Variant	Constraint checks (schema/t	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics

	dence)		2)	yping) | Extensions: ablation, hyperparameter sweep, robustness checks			, Audit
453	AuditInsights (Data/Evidence)	Data	Audit (Variant 3)	Drift detection (KS/PSI/MMD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
454	AuditInsights (Data/Evidence)	Data	Links (Variant 4)	Record linkage (Fellegi–Sunter) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
455	AuditInsights (Data/Evidence)	Data	Evidence Audit (Variant 5)	Provenance tracking + hashing | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
456	AuditInsights (Data/Evidence)	Data	Audit (Variant 6)	Missingness analysis (MCAR/MAR/MNAR) |	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit

				Extensions: ablation, hyperparameter sweep, robustness checks			
457	AuditInsights (Data/Evidence)	Data	ConsistencyAudit (Variant 7)	Constraint checks (schema/typing) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
458	AuditInsights (Data/Evidence)	Data	Audit (Variant 8)	Drift detection (KS/PSI/MMD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
459	AuditInsights (Data/Evidence)	Data	Links (Variant 9)	Record linkage (Fellegi–Sunter) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
460	AuditInsights (Data/Evidence)	Data	Evidence Audit (Variant 10)	Provenance tracking + hashing | Extensions:	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit

				ablation, hyperparameter sweep, robustness checks			
461	AuditInsights (Data/Evidence)	Data	Audit (Variant 11)	Missingness analysis (MCAR/MAR/MNAR) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
462	AuditInsights (Data/Evidence)	Data	ConsistencyAudit (Variant 12)	Constraint checks (schema/typing) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
463	AuditInsights (Data/Evidence)	Data	Audit (Variant 13)	Drift detection (KS/PSI/MMD) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
464	AuditInsights (Data/Evidence)	Data	Links (Variant 14)	Record linkage (Fellegi–Sunter) | Extensions: ablation,	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit

				hyperparameter sweep, robustness checks			
465	AuditInsights (Data/Evidence)	Data	Evidence Audit (Variant 15)	Provenance tracking + hashing | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Logs/Evidence/Data	, Evaluation, , Audit	/Consistency, Statistics, Audit
466	Insights (/)		(Variant 1)	Shapley value decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
467	Insights (/)		(Variant 2)	Oaxaca–Blinder decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
468	Insights (/)		(Variant 3)	Time-series attribution (intervention analysis) | Extensions: ablation,	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit

				hyperparameter sweep, robustness checks			
469	Insights (/)		Structure (Variant 4)	Structural decomposition analysis (SDA) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
470	Insights (/)		Causal (Variant 5)	Causal attribution (path-specific effects) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
471	Insights (/)		(Variant 6)	Shapley value decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
472	Insights (/)		(Variant 7)	Oaxaca–Blinder decomposition | Extensions: ablation,	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit

				hyperparameter sweep, robustness checks			
473	Insights (/)		(Variant 8)	Time-series attribution (intervention analysis) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
474	Insights (/)		Structure (Variant 9)	Structural decomposition analysis (SDA) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
475	Insights (/)		Causal (Variant 10)	Causal attribution (path-specific effects) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
476	Insights (/)		(Variant 11)	Shapley value decomposition | Extension	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust,

				s: ablation, hyperparameter sweep, robustness checks			Audit
477	Insights (/)		(Variant 12)	Oaxaca–Blinder decomposition | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
478	Insights (/)		(Variant 13)	Time-series attribution (intervention analysis) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
479	Insights (/)		Structure (Variant 14)	Structural decomposition analysis (SDA) | Extensions: ablation, hyperparameter sweep, robustness checks	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency, Robust, Audit
480	Insights (/)		Causal (Variant 15)	Causal attribution (path-specific	Data/Model/CausalGraph	, , Mechanism	CI, InterpretationConsistency,

				effects) | Extensions: ablation, hyperparameter sweep, robustness checks			Robust, Audit
481	ModelInsights (+Divergence)		(Variant 1)	Stacking / blending | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
482	ModelInsights (+Divergence)		Model (Variant 2)	Bayesian model averaging (BMA) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
483	ModelInsights (+Divergence)		(Variant 3)	Triangulation across methods | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
484	ModelInsights (+Divergence)		DivergenceInterpretation (Variant 4)	Disagreement analysis + error clustering | Extensions:	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit

				ablation, hyperparameter sweep, robustness checks			
485	ModelInsights (+Divergence)		Audit (Variant 5)	Selective reporting audit protocols | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
486	ModelInsights (+Divergence)		(Variant 6)	Stacking / blending | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
487	ModelInsights (+Divergence)		Model (Variant 7)	Bayesian model averaging (BMA) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
488	ModelInsights (+Divergence)		(Variant 8)	Triangulation across methods | Extensions: ablation, hyperparameter sweep, robustness	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit

				checks			
489	ModelInsights (+Divergence)		DivergenceInterpretation (Variant 9)	Disagreement analysis + error clustering | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
490	ModelInsights (+Divergence)		Audit (Variant 10)	Selective reporting audit protocols | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
491	ModelInsights (+Divergence)		(Variant 11)	Stacking / blending | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
492	ModelInsights (+Divergence)		Model (Variant 12)	Bayesian model averaging (BMA) | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
4	ModelInsi		(Variant	Triangulat	ModelOutputs+Ev	,	Consiste

93	ghts (+Divergence)		13)	ion across methods | Extensions: ablation, hyperparameter sweep, robustness checks	idence	Divergence, Robust	ncy, DivergenceEvidence, Robust, Audit
494	ModelInsights (+Divergence)		DivergenceInterpretation (Variant 14)	Disagreement analysis + error clustering | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
495	ModelInsights (+Divergence)		Audit (Variant 15)	Selective reporting audit protocols | Extensions: ablation, hyperparameter sweep, robustness checks	ModelOutputs+Evidence	, Divergence, Robust	Consistency, DivergenceEvidence, Robust, Audit
496	Insights (Insights)		Metrics (Variant 1)	MCDA (AHP/TOPSIS/VIKOR) | Extensions: ablation, hyperparameter sweep, robustness checks	//Constraints+InsightsOutputs	, , Metrics	, Interpretable, Evaluation,
49	Insights (Insights)		Risk (Variant	Utility/value	//Constraints+InsightsOutputs	, , Metrics	, Interpret

7			2)	function modeling | Extensions: ablation, hyperparameter sweep, robustness checks			able, Evaluation,
498	Insights (Insights)		Thresholds (Variant 3)	Threshold policy learning | Extensions: ablation, hyperparameter sweep, robustness checks	//Constraints+InsightsOutputs	, , Metrics	, Interpretable, Evaluation,
499	Insights (Insights)		(Variant 4)	Cost-sensitive decisioning | Extensions: ablation, hyperparameter sweep, robustness checks	//Constraints+InsightsOutputs	, , Metrics	, Interpretable, Evaluation,
500	Insights (Insights)		Evaluation (Variant 5)	Post-decision evaluation (uplift/ROI) | Extensions: ablation, hyperparameter sweep, robustness checks	//Constraints+InsightsOutputs	, , Metrics	, Interpretable, Evaluation,