Comparing content marketing strategies of digital brands using machine learning

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Appendix. Measurement and Items

Table A1 Negative and positive cues (Disney)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
little	16.58	26.74	trailer	3.62	22.78	trailer	-2.42	21.8
Disney	6.8	21.93	theater	8.9	13.89	more	6.75	9.95
http	-1.85	19.53	theatre	1.5	8.58	come	-3.69	9.36
theatre	3.7	12.94	Disneyland	-5.71	8.58	theater	6.68	8.95
star	9.22	12.7	live	-0.25	8.01	war	3.48	5.94
trailer	-1.82	12.11	make	-5.64	7.3	make	-12.73	5.78
more	-5.03	10.84	my	-3.77	5.26	Mickey	-0.53	4.92
my	-7.58	10.54	war	1.04	5.22	theatre	7.17	4.04
live	0.62	8.5	get	3.74	5.01	new	6.03	3.78
make	-6.94	7.51	Disney	3.09	4.72	history	-0.43	3.54
Mickey	-2.9	7.42	look	-7.17	4.71	http	0.57	3.33
play	3.27	6.89	come	-4.32	4.58	magic	3.19	3.07
theater	3.93	6.46	little	1.15	4.18	my	-3.43	1.99
now	12.36	5.04	Beast	-2.31	3.77	now	13.76	1.83
find	-6.02	4.36	open	-8.41	3.26	star	-0.01	1.51
war	-2.46	4.17	first	-3.91	3.24	live	4.32	1.46
ticket	4.38	3.85	Mickey	-3.2	3.12	first	-1.37	1.45
come	-6.39	3.84	all	-3.32	3.09	big	0.97	1.25
Pixar	1.09	3.62	time	-4.22	2.02	little	4.2	1.18
premiere	6.34	3.59	magic	-2.51	1.9	look	-2.51	0.82
just	-3.91	3.51	find	-9.61	1.52	premiere	4.38	0.54
all	-0.48	3.36	premiere	6.12	1.39	open	0.66	0.54
first	-2.53	3.31	here	8.32	0.97	all	0.25	0.54
new	-0.05	3.21	new	-1.35	0.82	Disneyland	-0.87	0.51
look	-0.46	2.93	today	8.13	0.27	film	4.75	0.4
like	-2.36	2.77	see	0.2	0.2	Disney	6.51	0.37
film	2.75	2.47	history	1.7	-0.67	see	2.19	0.33
big	6.82	1.85	star	0.08	-1.13	into	-3.88	0
open	1.52	1.26	adventure	1.4	-1.32	Pixar	-3.91	-0.17
into	-3.77	1.05	into	0.21	-1.79	today	12.59	-0.36
Disneyland	-0.26	0.11	http	-1.29	-1.87	find	-7.18	-0.66
today	3.04	-0.59	just	-4.09	-1.88	ticket	4.83	-1.48
adventure	7.82	-2.28	more	4.77	-1.95	just	-2.11	-1.49
history	2.91	-2.76	big	2.86	-2.19	get	-1.76	-1.51
day	3.33	-2.91	now	12.23	-2.45	day	6.5	-1.93
here	12.54	-3.57	world	2.61	-3.03	here	6.77	-3.2
magic	3.77	-4.18	like	-4.38	-3.3	world	3.36	-3.35
see	-1.99	-4.21	day	4.13	-5.33	like	-0.03	-4.28
story	10.06	-4.7	film	10.04	-5.68	Beast	1.24	-4.72
Beast	-2.72	-5.17	play	4.15	-6.25	time	-2.38	-4.78
time	-3.52	-6.02	ticket	9.9	-6.55	adventure	2.55	-7.37
get	1.49	-7.87	story	9.2	-7.01	story	7.96	-7.94
world	6.41	-9.41	Pixar	5.88	-7.14	play	1.71	-9.65

Table A2 Negative and positive cues (Netflix)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
Netflix.has.it	8.19	15.32	December	20.6	13.47	Netflix.has.it	2.61	11.41
here	7.88	15.19	Netflix.has.it -	0.92	12.72	House	-6.97	4.71
today	1.94	13.34	history	0.79	7.47	marat	-2.41	4.49
wants	3.46	8.92	met	0.33	6.05	met	-0.49	4.47
met	1.5	6.66	today	-2.84	4.27	today	-4.23	3.33
without	-0.23	6.63	arrives	9.12	4.03	world	6.24	2.43
arrives	4.23	6.54	House	-2.56	3.86	October	2.84	2.18
neither	12.31	5.94	friend	0.62	3.3	history	-2.16	1.84
available	13.54	5.42	week	-3.34	2.3	someone	-2.61	0.92
Netflix	13.95	5.09	marat	-3.17	2.28	always	0.37	0.32
tea	2.19	4.88	here	0.8	2.26	here	-3.68	0.22
December	12.13	4.54	all	-8.02	2.2	arrives	4.22	0.1
http	2.91	3.73	you	2.8	1.57	http	2.87	0.1
who	0.43	3.29	serie	-3.92	1.45	season	0.03	-0.05
you	2.51	3.05	March	6.29	0.65	new	1.92	-0.18
title	3.68	2.63	best	0.79	0.57	new.1	-2.41	-0.27
history	-3.31	2.4	original	-5.62	0.5	wants	2.07	-0.45
week	0.96	2.1	someone	-0.54	0.07	OITNB	0.83	-0.71
OITNB	3.83	1.66	BetterCallSaul	3.66	-0.1	neither	5.66	-0.75
season	-1.1	1.52	tea	1.55	-0.88	March	-3.86	-0.8
weather	5.15	1.35	new	5.06	-0.93	best	-2.25	-0.81
great	-3.67	1.24	watch	7.83	-0.98	you	-1.58	-1
lifetime	-0.99	-0.21	who	-4.42	-1.29	all	-5.92	-1.05
someone	-3.66	-0.52	season	2.2	-1.53	original	-3.32	-1.11
something	-4.75	-0.54	http	5.14	-1.81	without	-5.18	-1.55
thing	4.03	-0.56	photo	8.08	-1.97	serie	-1.71	-1.57
best	-1.58	-0.96	episode	6.16	-1.97	week	-4.47	-1.64
BetterCallSaul	-3.16	-1.12	great	-4.39	-2.03	available	7.49	-1.77
March	5.4	-1.48	title	4.34	-2.08	title	2.95	-2.12
episode	3.3	-2.34	October	5.48	-2.18	great	-1.16	-2.19
new	1.39	-2.79	thing	0.61	-2.18	something	1.9	-2.54
always	-0.89	-2.98	wants	7.38	-2.88	who	-3.44	-3.04
all	-7.34	-3.47	OITNB	0.37	-3.16	thing	0.07	-3.3
marat	-3.52	-3.54	weather	0.4	-3.23	lifetime	0.34	-3.46
new.1	1.32	-3.57	without	-1.74	-3.38	BetterCallSaul	-1.21	-3.54
serie	-0.04	-4.2	available	5.9	-3.42	episode	5.94	-3.9
October	1.72	-4.52	neither	4.19	-3.5	tea	3.52	-4
friend	-2.74	-4.92	always	-0.63	-3.76	December	4.37	-4.05
original	1.21	-5.56	world	5.93	-3.95	friend	-4.34	-4.28
House	-0.43	-5.7	lifetime	-0.87	-4.32	weather	3.63	-4.78
world	10.96	-6.51	something	1.97	-4.52	watch	8.19	-6.84
watch	15.65	-7.98	new.1	7.99	-5.6	Netflix	15.59	-7.21
cover	15.51	-9.63	cover	7.95	-6.63	cover	11.42	-7.21
alone	12.09	-9.87	alone	17.48	-7	photo	16.07	-10.7
photo	19.25	-10.66	Netflix	18.65	-8.81	alone	17.26	-10.8

Table A3 Negative and positive cues (Microsoft)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
http	35.11	29.48	most	8.6	11.96	screen	7.41	7.26
photo	2.93	26.13	photo	8.37	10.08	http	8.79	6.25
Lumia	25.15	17.72	party	2.31	9.03	RSVP	9.14	5.69
Nokia	23.18	15.85	Cortana	0.64	7.93	Windows	10.22	5
test	1.85	12.99	camera	2.27	7.54	most	2.66	4.91
game	-2.81	10.87	RSVP	7.12	6.78	HTC	2.84	4.57
party	-1.47	10.18	screen	7.71	6.4	win	2.95	3.43
Windows	9.5	8.9	know	8.36	5.19	time	4.84	3.31
app	0.45	8.78	feature	-1.41	5.07	now	3.25	3.04
Facebook	-3.05	8.01	love	6.64	5	know	1.29	2.7
new	21.19	7.9	more	12.55	4.65	new	3.71	2.59
post	7.46	7.89	time	16.41	4.21	camera	11.35	2.35
Cortana	4.04	7.81	Facebook	9	3.3	game	5.46	1.98
friend	0.27	7.61	app	-0.28	2.98	Microsoft	6.28	1.93
HTC	-3.39	7.25	test	7.23	2.7	friend	9.44	1.92
RSVP	7.05	7.04	post	10.94	2.29	video	3.69	1.86
most	3.6	6.92	win	2.73	1.81	post	11.19	1.46
camera	11.56	6.2	night	-4.18	1.15	love	9.41	1.38
here	-1.93	5.5	find	2.41	1.14	night	0.46	1.3
like	-2.76	5.06	game	4.84	0.96	Lumia	9.82	1.21
music	-2.67	5	why	9.48	0.92	Cortana	1.26	1.09
now	4.03	3.56	share	0.35	0.19	favorite	0.47	0.98
time	-0.49	3.55	Nokia	20.74	0.17	Facebook	3.02	0.38
all	5.77	3.08	best	6.78	-0.07	zoom	2.76	0.28
best	-1.49	2.78	http	29.77	-0.18	Nokia	7.93	0.14
screen	-2.81	2.72	live	4.2	-0.24	more	9.04	0.12
favorite	-2.88	2.67	all	0.51	-0.53	smartphone	8.91	-0.01
today	9.3	2.54	music	2.38	-0.54	app	-0.54	-0.02
win	3	2.22	new	20.26	-0.63	photo	5.19	-0.16
world	-2.36	0.58	video	3.41	-0.67	find	-2.32	-0.18
better	8.8	0.14	world	-2.36	-0.72	best	1.55	-0.2
why	8.12	0.09	now	4.05	-0.81	world	0.58	-0.22
smartphone	-0.16	-0.15	holiday	8.44	-1.08	all	9.17	-0.43
find	1.05	-0.32	smartphone	2.64	-1.17	here	-2.81	-0.57
zoom	-0.99	-0.47	friend	3.16	-1.75	test	7.44	-0.58
capture	5.26	-0.77	HTC	-0.48	-2.34	like	1.58	-1.03
Microsoft	4.54	-1.21	like	-0.86	-2.54	party	6.26	-2.09
share	-2.51	-1.54	here	-0.21	-2.99	phone	9.83	-2.33
live	3.07	-2.16	better	9.37	-3.25	Store	10.37	-3.45
more	16.82	-2.49	favorite	7.11	-3.25	share	2.67	-3.5
know	-0.48	-2.97	capture	6.84	-3.63	feature	6.26	-4.31
Store	5.88	-2.98	Store	10.82	-3.92	music	3.67	-4.38
holiday	13.01	-3.01	today	11.43	-4.16	why	10.54	-4.73
night	-5.03	-3.41	people	7.08	-4.79	better	9.42	-5.66
phone	2.55	-4.28	Microsoft	4.74	-4.8	holiday	8.22	-6.04
people	-1.56	-4.75	zoom	5.86	-5.59	capture	6.56	-6.54
feature	7.15	-6.85	phone	8.12	-5.96	today	8.91	-6.68
video	4.69	-6.99	Lumia	25.54	-6.32	people	5.64	-6.7
love	-0.53	-7.15	Windows	21.4	-11.4	live	6.41	-8.38

Table A4 Negative and positive cues (YouTube)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
video	-3.02	15.39	year	20.24	19.63	http	19.12	36.17
world	11.19	13.66	MV	-9.73	16.15	cover	11.96	22.24
MV	-12.24	9.77	video	5.51	14.78	MV	-13.67	11.92
cover	-7.54	9.2	http	4.14	11.02	video	7.2	10.74
now	-6.98	9.11	cover	2.09	11.01	day	-3.34	8.36
all	1.92	7.85	India	18.21	10.24	life	7.52	8.11
want	-1.43	7.62	new	0.65	9.58	dance	-5.55	7.22
live	-5.64	7.07	world	6.18	6.86	music	5.33	7.09
here	-5.43	6.46	creator	13.88	6.22	here	-7.72	5.97
see	-3.64	6.12	today	4.54	5.6	all	-0.35	4.62
only	9.33	5.04	know	0.56	4.16	want	-3.01	4.31
best	5.31	4.3	see	-0.74	4.09	only	6.7	4.28
new	-6.66	4.24	live	-2.16	3.61	first	-1.87	3.56
http	0.51	3.76	all	5.44	3.48	new	-5.17	3.22
year	5.5	3.39	story	6.84	2.71	YouTube	16.54	2.77
song	3.91	3.28	day	-3.79	2.69	India	1.9	2.52
first	0.52	3.09	playlist	0.14	2.65	year	6.85	2.22
know	-3.38	2.83	want	-0.77	1.58	Kapoor	4.92	0.8
creator	7.4	2.73	here	-4.84	1.06	love	-0.62	0.65
come	-0.78	2.7	love	2.61	0.31	now	-1.08	0.43
India	6.28	1.19	week	5.11	0.04	know	-3.81	0.3
music	-3.04	1.09	YouTube	12.82	-0.07	movie	6.47	0.26
day	-7	0.96	now	0.66	-0.09	live	-4.05	-0.03
trailer	5.1	0.72	song	2.01	-0.29	story	5.4	-1.48
today	-2.97	0.48	trailer	0.85	-0.38	like	2.23	-1.87
look	2.22	0.47	first	-2.08	-0.54	see	-0.89	-2.29
life	-0.27	0.04	best	7.33	-1.19	week	2.4	-2.68
love	3.46	-0.38	movie	-4.52	-1.57	best	2.25	-2.81
watch	-2.3	-1.31	Kapoor	0.91	-2.18	creator	-6.57	-2.91
like	-3.96	-1.55	only	8.97	-2.44	look	-1.42	-3.06
YouTube	0.73	-1.57	show	0.54	-2.68	today	1.79	-3.09
dance	-1.77	-1.63	watch	3.85	-3.23	time	-7.49	-3.64
movie	-2.11	-1.99	time	-1.85	-3.47	playlist	6.63	-3.65
story	1	-2	need	2.78	-3.56	come	-1.46	-4.36
Kapoor	0.09	-2.8	dance	-3.57	-4.24	trailer	7.58	-4.86
week	1.99	-2.83	look	-3.2	-4.72	world	4.38	-5.56
need	3.37	-3.24	life	-1.06	-5.21	song	-6.53	-6.29
playlist	7.14	-3.82	like	-7.18	-6.31	friend	-1.36	-6.38
show	-1.22	-4.51	come	3.88	-6.46	show	0.89	-6.63
friend	2.21	-6.43	friend	-4.38	-6.52	watch	14	-7.04
time	-5.3	-6.64	music	-0.68	-7.85	need	6.92	-10.88

Table A5 Negative and positive cues (Linkedin)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
career	5.44	13.04	headlines	4.77	18.63	headlines	-9.15	18.42
headlines	-12.14	11.99	most	7.3	12.14	people	0.77	15.89
share	2.43	11.55	week	0.5	10.42	world	-0.55	13.26
Friday	14.05	10.76	http	30.74	10.28	DailyRundown	-14.95	12.4
see	5.82	9.94	opportunity	14.16	9.65	success	7.6	11.45
DailyRundown	-11.41	8.38	top	0.41	9.16	share	-0.8	9.83
success	7.27	8.26	work	5.13	6.67	here	-1.18	9.02
learn	0.54	7.68	share	-0.93	6.13	next.	4.62	7.68
opportunity	8.8	7.56	success	4.34	6.03	want	-1.06	6.71
world	-2.16	7.2	people	-0.55	5.53	company	-1.3	5.28
think	0.98	6.69	world	-0.22	5.14	tip	-0.37	5.27
top	-4.85	6.57	new	1.74	3.92	top	-4.31	5.13
people	-1.69	5.88	tip	2.86	3.74	opportunity	10.73	5.05
work	2.12	5	career	-1.79	3.49	career	-0.99	4.12
X1edin	4.81	4.16	company	1.19	3.39	learn	3.57	3.91
connect	0.03	3.23	learn	-3.69	3.09	work	1.6	3.43
use	3.76	2.61	time	8.72	2.58	new	-0.41	3.26
most	-3.74	1.77	profile	1.88	1.68	get	6.42	2.59
here	-4.55	1.64	today	3.86	1.16	think	-2.53	1.9
today	0.97	1.63	think	-1.2	1.12	now	4.01	1.86
all	-5	1.49	see	9.67	0.97	know	-0.9	1.85
http	11.77	1.01	Friday	10.06	0.4	Friday	12.24	1.48
look	2.06	1	use	3.74	-0.06	today	-0.38	0.91
network	0.93	0.97	next.	4.17	-0.99	most	-5.59	0.2
photo	1.26	0.89	connect	-3.37	-1.16	job	4.05	-0.34
find	1.01	0.67	now	0.2	-1.67	help	9.54	-0.49
time	-6.04	0.19	DailyRundown	4.51	-1.76	best	-5.73	-0.51
know	1.87	0.05	look	1.38	-2.1	look	-2.13	-0.96
professional	-0.3	-0.14	here	12.36	-2.22	connect	-3.79	-1.02
now	3.54	-0.17	find	1.25	-2.25	use	2.82	-1.03
get	4.7	-0.23	all	-0.98	-2.67	photo	2.18	-1.5
start	1.15	-0.25	know	1.43	-2.99	network	-1.96	-1.55
new	-2.76	-0.68	start	-0.53	-3.69	post	6.88	-1.67
week	-4.36	-1.19	best	-0.98	-3.91	week	2.6	-1.77
post	11.91	-1.62	like	-1.28	-4.09	http	11.68	-1.96
profile	-1.47	-1.87	photo	8.16	-4.49	see	7.92	-2.05
next.	0.74	-2.2	X1edin	13.08	-4.68	X1edin	4.61	-2.16
job	6.16	-2.37	get	2.74	-5.27	find	-0.47	-2.6
help	7.56	-2.53	professional	-0.44	-6.11	time	-2.93	-2.8
company	-1.12	-2.69	job	8.45	-6.69	professional	-3.87	-2.85
best	-1.98	-2.79	network	6.25	-6.9	all	-7.38	-3.1
tip	1.2	-2.83	want	2.47	-7.34	profile	-0.65	-4.23
want	-4.57	-3.17	help	9.31	-9.5	start	-1.99	-4.61
like	-1.73	-3.6	post	12.75	-9.68	like	1.96	-5.14

Table A6 Negative and positive cues (Google)

Likes	Negative	Positive	Comments	Negative	Positive	Shares	Negative	Positive
photo	8.63	49.19	photo	12.14	43.83	day	2.86	13.58
day	5.78	26.49	homepage	7.24	17.7	celebrate	-12.06	11.86
Google	10.48	25.05	today	3.59	16.94	Google	3.42	11.34
http	8.11	20.47	day	6.31	16.25	view	1.76	9.35
homepage	12.51	19.87	http	-0.06	11.71	doodle	-4.74	7.62
app	4.33	17.43	doodle	4.8	11.45	year	1.91	6.01
today	9.61	16.58	Google	3.26	10.84	look	2.42	5.74
doodle	8.99	14.62	year	2.41	9.91	homepage	-2.16	4.03
year	6.38	13.96	GoogleTrend	-10.21	9.56	first	11.37	3.97
first	18.87	9.03	work	6.54	9.11	GoogleTrend	-6.63	3.89
view	1.93	8.1	view	1.28	8.37	http	4.75	3.74
birthday	13.64	6.83	birthday	7.61	8.3	today	-1	3.7
euch	-8.05	5.57	euch	-6.69	7.62	learn	-0.86	3.36
art	7.06	5.14	die	0.65	7.5	birthday	-5.95	2.88
die	0.24	4.98	world	2.31	7.34	new	4.35	2.84
play	4.58	4.94	app	1.82	6.74	euch	-2.43	2.46
new	3.66	4.35	find	1.22	6.27	now	2.22	1.99
world	-1.39	4.11	start	10.22	6.1	GoogleDoodle	3.81	1.97
look	-0.21	3.42	celebrate	-1.55	4.69	youtube	1.89	1.73
celebrate	-2.53	3.42	now	11.49	3.8	watch	0.23	1.39
find	3.58	3.37	new	4.81	3.24	map	0	1
learn	-0.69	3.35	learn	-1.43	2.79	find	1.33	0.46
GoogleTrend	2.3	3.12	love	4.5	2.58	work	-2.32	0.41
like	-0.69	3.05	here	-2.28	2.47	like	-0.94	0.2
check	0.24	2.52	GoogleDoodle	-1.09	2.41	help	9.76	0.14
GoogleDoodle	1.13	2.37	like	4.87	1.54	know	1.33	-0.08
map	-1.34	2.14	play	-1.77	1.36	favorite	0.5	-0.19
time	-0.5	2.07	look	6.28	1.19	people	-2.87	-0.21
here	1.77	2.01	first	17.65	0.56	photo	-3.68	-0.21
now	0.88	1.8	search	0.96	0.39	art	2.89	-0.42
work	-1.02	1.69	map	4.98	0.26	app	1.74	-0.51
know	4.04	0.5	video	-0.86	-0.05	check	-1.63	-0.62
help	6.45	0.42	art	2.71	-0.11	play	-1.33	-1
people	1.25	0.38	people	7.1	-0.31	time	0.8	-2.56
video	6.19	0.26	check	-4.32	-1.05	Android	4.68	-2.74
watch	3.39	0.11	watch	-0.31	-1.49	die	4.66	-2.76
Android	7.92	-0.44	help	1.21	-3.11	start	3	-2.95
favorite	1.28	-0.45	youtube	1.27	-3.17	video	3.59	-3.19
love	2.83	-0.52	time	2.66	-3.25	search	0.53	-3.3
start	4.52	-1.41	Android	9.01	-4.93	love	-1.2	-3.52
youtube	1.56	-1.84	favorite	3.87	-5.2	here	-2.47	-4.67
search	-3.72	-2.67	know	4.65	-6.53	world	-6.66	-4.69

Appendix Random forest call

```
randomForest(formula = as.factor(Disney _y) ~ .,
                    data = crs$dataset[crs$train, c(crs$input, crs$target)],
                    ntree = 500, mtry = 7, importance = TRUE, replace = FALSE, na.action = randomForest::na.roughfix)

                      Type of random forest: classification
                            Number of trees: 500
No. of variables tried at each split: 7

                OOB estimate of    error rate: 17.37%
Confusion matrix:
        0      1 class.error
0 3136    56    0.01754386
1    638 166    0.79353234
```

Appendix XGboost call

```
   xgb.train(params = params, data = dtrain, nrounds = nrounds,
      watchlist = watchlist, verbose = verbose, print_every_n = print_every_n,
      early_stopping_rounds = early_stopping_rounds, maximize = maximize,
```

```
        save_period = save_period, save_name = save_name, xgb_model = xgb_model,
        callbacks = callbacks, max_depth = 6, eta = 0.3, num_parallel_tree = 1,
        nthread = 2, metrics = "error", objective = "binary:logistic")
params (as set within xgb.train):
    max_depth = "6", eta = "0.3", num_parallel_tree = "1", nthread = "2", metrics = "error", objective = "binary:logistic",
silent = "1"
xgb.attributes:
    niter
callbacks:
    cb.print.evaluation(period = print_every_n)
    cb.evaluation.log()
# of features: 49
niter: 50
nfeatures : 49
formula :
         Disney _y ~ .
<environment: 0x1421d2a8>
evaluation_log:
        iter train_error
           1       0.169220
           2       0.168673
---
          49       0.155543
          50       0.155361

Final iteration error rate:
      iter train_error
1:      50        0.16
```