A Framework for Managing Quality Requirements for Machine Learning Systems: Interview Evaluation

Interview type: Qualitative

Who we are?

I am Khan Mohammad Habibullah working as a PhD student, under the supervision of Associate Professors Jennifer Horkoff and Gregory Gay. We are the members of the Interaction Design and Software Engineering division in Computer Science and Engineering Department, University of Gothenburg and Chalmers University of Technology. Our research topic is **"Non-functional Requirements for Machine Learning".** Our research is funded by the Swedish Research Council (VR).

Background:

Machine Learning (ML) is used increasingly in real world applications, successes include image recognition, natural language processing, and autonomous systems. Despite the advances allowed by ML, much recent attention has been paid to certain qualities of ML solutions (fairness, transparency, privacy, security, testability). From a Requirement Engineering (RE) perspective, such qualities are also known as non-functional requirements (NFRs).

Currently, we are focusing on NFRs for ML solutions, and as a part of the solutions we are proposing a quality framework for defining, specifying, measuring, monitoring, and analyzing NFRs for ML systems.

We are scheduling interviews with experts to evaluate and get feedback on our proposed quality framework for ML systems. Our ambition is to conduct interviews with representatives in Sweden involved in requirements engineering and AI/ML. We need your help to evaluate our proposed quality framework for ML systems. After careful synthesis of the interviews, during which you will get a chance to validate and remove collected information.

Formalities and Practicalities

We plan to write a research article based on the interview results. To support our analysis, we would like to record the interview. As an individual interviewee, you are guaranteed anonymity, and no company names will be published in the resulting article. Only the researchers will know which interviewee provided what specific information, and we will, as a first step, remove any personal identifiers from the transcribed interviews. Only high-level codes and possibly selected direct quotes will be shared publicly in the article – with no traceability back to individual interviewees. We will store the recordings and the anonymized transcripts securely on a Onedrive hosted by Chalmers University of Technology along with a master file containing your contact information – in case we need to validate any findings at a later stage. The content will be accessible only by the researchers and stored for five years after the publication of the research article. At the beginning of the interview, we will explicitly ask you for your consent to store your contact information for the purpose described. You will participate in the interview voluntarily. You are free to skip answering any question and can choose to stop the interview at any time. Furthermore,

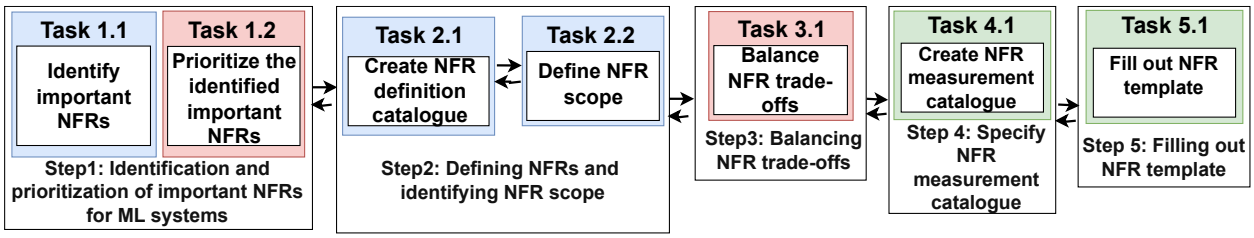
you can request us to turn off the recording for specific parts of the interview. Please interrupt us at any time if you need us to clarify terms or definitions. We will enable the automatic transcription service provided by Microsoft Teams during the interviews. After the interview, you will get an edited transcript per email. You will then have the chance to validate the content, remove any specific information if needed, or further clarify yourself. If the Internet connection is lost or the meeting fails, please reconnect as soon as possible. If it is not possible to recover within a few minutes, we will reschedule the interview via email.

Questions:

Demographic (10 minutes):

1. Please introduce yourself and your role in this company/ organization.
2. What is the size of your company/organization in terms of number of employees?
3. Do you work in an academic or industrial context, or a blend of the two?
4. Total years of experience in the industry/academia and how long you are in current position?
5. Please describe your responsibilities (e.g., Product owner, developer, Software Architect) in your organization.
6. Please describe your experience working with NFRs. (Provide definition of NFRs if necessary)
7. Please describe your experience working with ML.

NFR Framework Related Questions (30 minutes):



8. In Step 1 of the framework, a practitioner identifies important types of NFRs (e.g., accuracy, privacy) and prioritizes important NFR types for ML systems. Could this step improve the RE process for systems that you develop or not? If yes, why and how? If no, then why not?
    a. Would you discard or change any tasks in this step? If yes, why and how?

9. In Step 2 of the framework, practitioners create a NFR definition catalogue for the chosen NFR types, determines the scope of the NFR types, and re-define NFR types depending on the scope, if necessary. Do you think this step could improve the RE process for systems that you develop or not? If yes, why and how? If no, then why not?
    a. Would you discard or change any tasks in this step? If yes, why and how?

10. In Step 3, practitioners identify and balance trade-offs between the NFR types. Do you think this step could improve the RE process for systems that you develop or not? If yes, why and how? If no, then why not?
    a. Would you discard or change any tasks in this step? If yes, why and how?

11. Step 4 of the framework is to create a NFR measurement catalogue for ML systems. Do you think this step could improve the RE process for systems that you develop or not? If yes, why and how? If no, then why not?
    a. Would you discard or change any tasks in this step? If yes, why and how?

12. Step 5 of the framework asks you to fill in a template in order to specify specific NFRs for ML systems. Do you think this step could improve the RE process for systems that you develop or not? If yes, why and how? If no, then why not?
    a. Would you discard or change any tasks in this step? If yes, why and how?

13. Are there individual activities/steps that are not covered already that you would include?

14. Do you think this framework would be useful for ML systems development or not? If yes, what usefulness such a framework bringing to your RE process? If not, then why not?

    a. How would you measure or assess whether this framework was successful in offering these benefits?
15. Are you interested to use this framework in RE process of ML system development? Why / Why not?

16. Are you interested to perform a case study or action research study incorporating the proposed framework in your company / organization?

Are there any colleagues or someone else you know who may be interested to take part in this interview?