Homework: language goals

Programming Languages in Software Engineering at Constructor University Bremen

Maximum points: 10 Deadline: 2 November, 23:59

This homework assignment is a writing assignment. The focus is on setting specific, achievable targets, and specifying the methodology by which you will achieve them.

During the lectures, we've spent some time discussing the high-level goals of each team, but the two implementations have so far have been the same. It's time to state your team's goal explicitly, and pose a research question that you need to resolve to make progress on your goal.

A good goal has clear value, and should be focused on the user experience, rather than on the implementation details. At this point, it is not necessary to quantify the goal: just the direction you want to think in is sufficient.

Good	Bad
Automatically correct type errors.	Feed type errors into an LLM. (Why? What will it do with them?)
Detect and highlight hard-to-understand code.	Require good code. (What does good mean?)
Guarantee memory safety.	Develop novel type system features. (What value do they have to your users?)

> **Exercise 1 (3 pts):** State your goal in 1-2 sentences.

Due to the time constraints on this course, it is not feasible to build a language that would be a viable competitor to existing options. However, the time is sufficient to learn something about the difficulties involved in reaching your goal, and this is valuable in itself.

To help focus your attention, we will narrow the focus to a research question. Your research question can qualitative or quantitative, as long as you are able to develop a methodology for answering it.

Good	Bad
What patterns of type errors can and can't LLMs fix?	Can LLMs fix type errors? (Too broad.)
How does model choice impact the quality of generated fixes?	Which model is best at fixing type errors? (Assumes a one-dimensional ranking.)
To what degree do LLMs and humans agree on what "hard-to-understand code" entails?	Do developers listen to AI-generated feedback on their code? (Broad, hard to measure.)

> **Exercise 2 (3 pts):** State three research questions that would be interesting for your team.

Pick one of your questions as your primary one. The other two are reserves in case the primary question proves impractical to investigate.

With your goal and research question in mind, it is time to think about the specific steps you will take to answer your research question. This is your research methodology, and it should include both what you will do, and how you will measure the results.

Exercise 3 (4 pts): Describe your research methodology. Think about points like the following:

- What changes will you make to your language to investigate the research question?
- How will those changes inform your answer to the research question?
- What resources will you require, aside from your time?
- Why is this methodology a reliable way to answer the question?