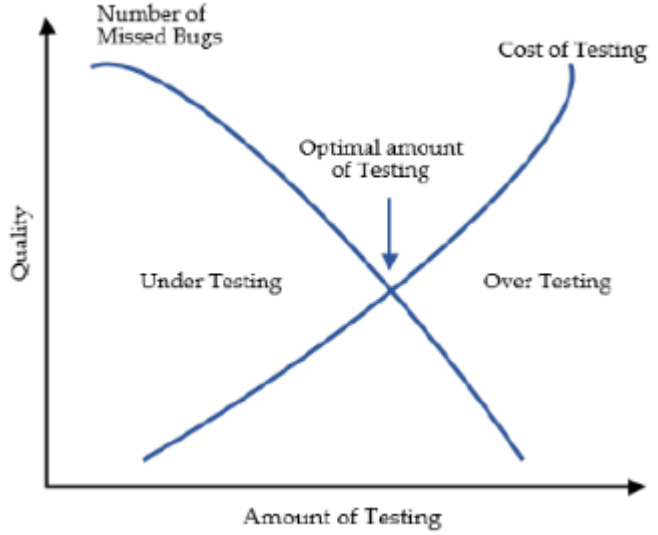
Feasibility of Using Large Language Models for Requirement-Based Software Testing

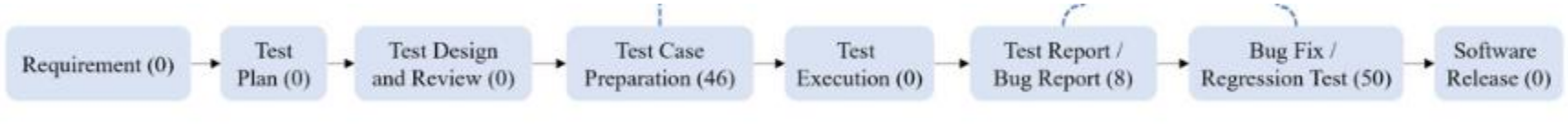
Outline

- Software testing overview
- Focus of this study
- Experimental Setup
  - Evaluation Procedure
  - Dronology Dataset
- Prompt engineering techniques
- Results

Software testing overview

- Quality assurance through testing
- Strategies
  - Unit testing
  - Integration testing
  - Acceptance/Validation testing
  - System testing
- Main focus of latest LLM research on System and Unit testing.

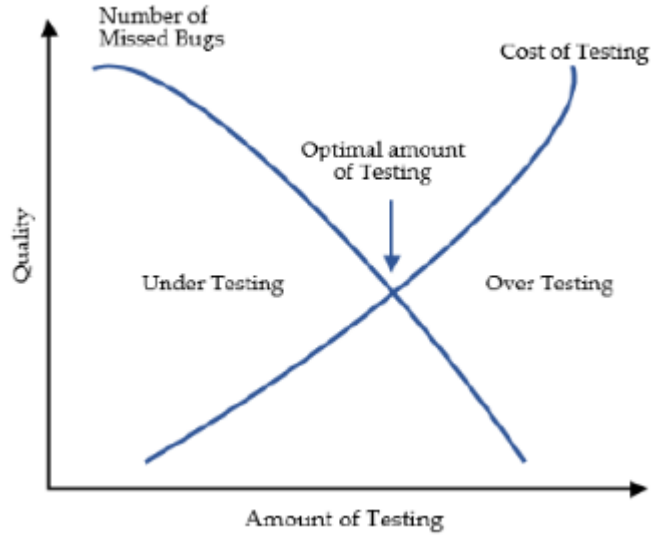




Wang, Junjie / Huang, Yuchao / Chen, Chunyang / Liu, Zhe / Wang, Song / Wang, Qing, **Software testing with large language models: Survey, landscape, and vision** 2024 *IEEE Transactions on Software Engineering*
Anwar, Nahid / Kar, Susmita, **Review paper on various software testing techniques & strategies,** 2019, *Global Journal of Computer Science and Technology* , Vol. 19, No. 2 p. 43-49

Focus of this study – Acceptance Testing

- First guarantee has to be that requirements are met
- Ensuring project meets base requirements
- Requirements highly dependent on domain and project leads



Experimental Setup

- Evaluation Procedure
  - Use prompt engineering techniques to generate testcases
  - Simple validation structure for initial quality estimate of model output + prompt
  - Basic Test Description structure shall be enforced
    - Requirement, test objective, preconditions, test steps, expected result
  - Human verification as final evaluation

Experimental Setup

- Evaluation on Dronology
  - Overview of Software and Requirements

https://dronology.info/

Prompt Engineering techniques

- Zero shot learning
- Chain of thought prompting
- Personas
- Providing context
- Multimodality
- Tree of thought
- Chain of density

Results

- Prompts examples …
- Models …
- Quality of output visualization
  - Performance of different prompts …

Q & A