

# Toward a Reliability Measurement Framework Automated Using Deep Learning

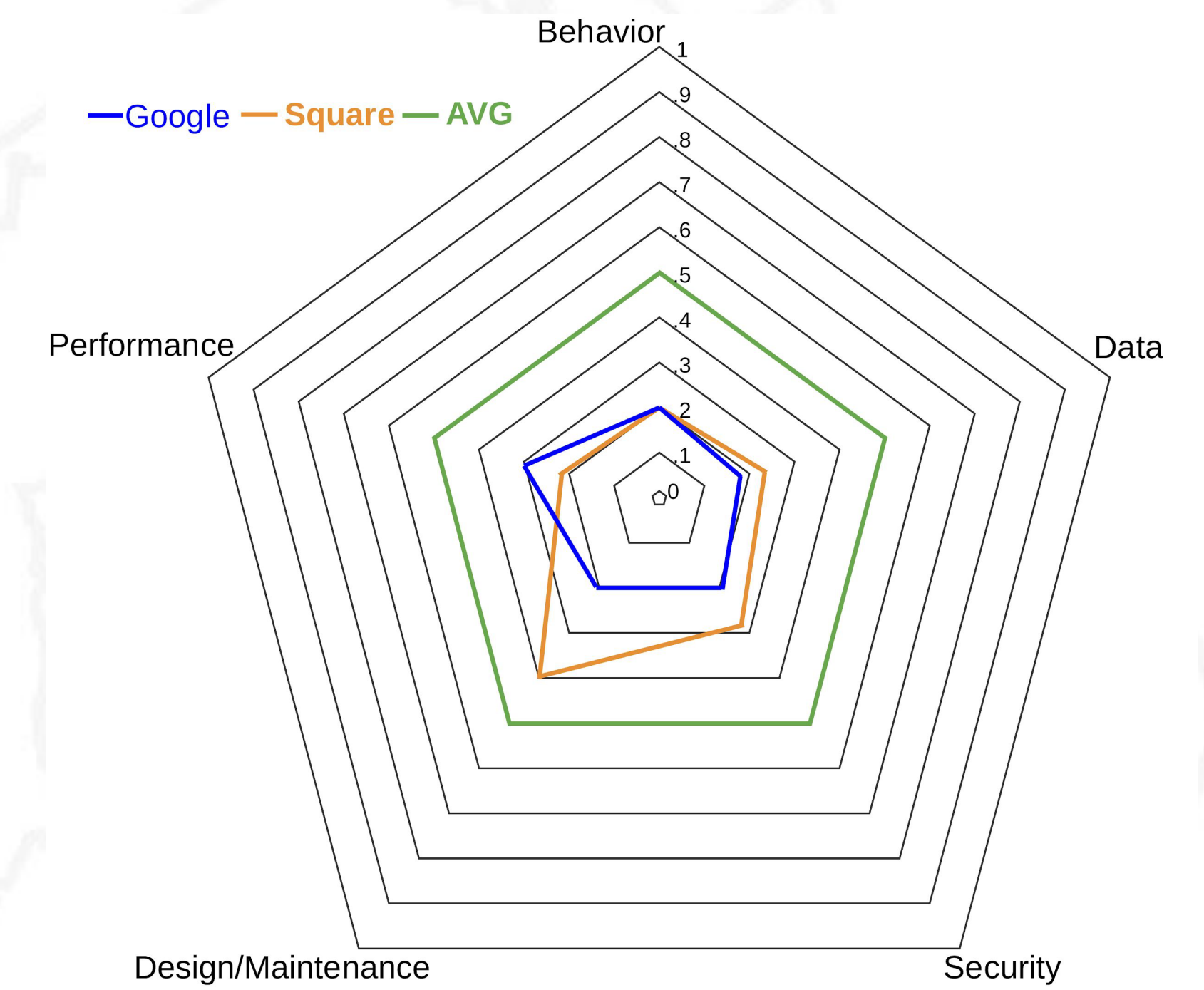
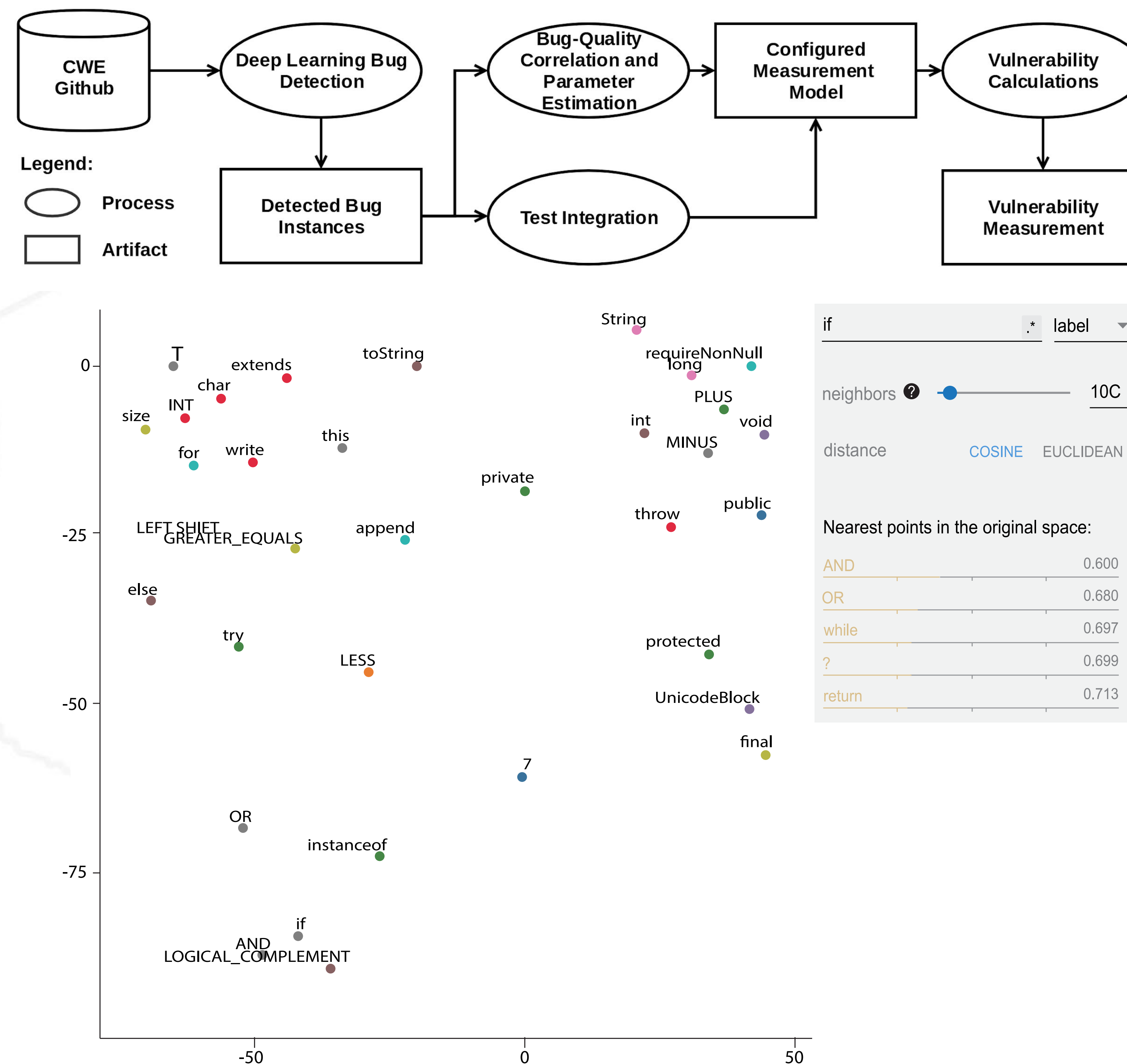
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## Goal

- Most sophisticated reliability and vulnerability software measurement models and frameworks require a heavy amount of manual tasks to produce valid results.
- We hope to use deep learning to automate these manual tasks to make such models and frameworks practical.

## Word Embeddings

- We are unable to perform deep learning tasks directly on code elements as they are text with no meaningful underlying numerical representation.
- We created word embeddings to represent code elements with real-valued vectors.
- Given source code, it is first transformed to an abstract syntax tree (AST) representation, then the AST is walked with Word2Vec (an algorithm based on skip-gram) performed for each node.
- Word embeddings were performed for JDK8 (15,355 unique code elements) and achieved a lowest loss of 2.69 and perplexity of 14.80.



## Future Work

- While the word embeddings achieved seem adequate, we will continue to refine them since all learning tasks are heavily affected by the quality of the word embeddings.
- We will begin to perform learning tasks to automate our framework: detection of semantic vulnerabilities, enforcement of natural language policies, classification of bugs to abstract quality aspects, and bug detection.

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