Learning to Describe Solutions for Bug Reports Based on Developer Discussions

Sheena Panthaplackel, Junyi Jessy Li, Milos Gligoric, Raymond Mooney
The University of Texas at Austin
When a bug is reported, developers engage in a dialogue to collaboratively understand it and ultimately resolve it.

1) User reports bug

2) Developers engage in the discussion (understand problem, diagnose cause, propose solution)

3) Bug is resolved with code changes

**Title:** Incorrect distance

**Utterance #1**
Seeing negative distance when using 1D grid.

**Utterance #2**
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**Utterance #3**
We do `x1 - x2`, which will be negative if `x1 < x2`.

**Utterance #4**
We should compute its absolute value.

*dev007 added a commit that referenced this issue*
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**Task:** Generate concise natural language description of the solution by synthesizing relevant content in the discussion when it emerges in real-time

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Data: 12K bug reports reports for open-source Java projects from GitHub Issues which are linked to a commit/PR.
Results: Generating Solution Descriptions

- Copy Title
- Transformer
- PLBART
Results: Generating Solution Descriptions

Based on automated metrics and human evaluation, PLBART outperforms baselines.
Generating Solution Descriptions in Real-Time

System generates at time step k
- Is there sufficient context about the solution at time step k?

- Rate the informativeness of the generated description:
  1 - Incomprehensible, completely incorrect, irrelevant
  2 - Generic, rephrasing the problem
  3 - Includes some useful information but does not capture the solution
  4 - Partially captures solution
  5 - Completely captures solution

3.3

When sufficient context is available, system output is useful
Summary

- Proposed new task of generating solution descriptions based on ongoing bug report discussions
- Collected and released new dataset of more than 12K examples to study the task
- Benchmarked various models for generating solution descriptions
- Demonstrated that PLBART generates informative descriptions
- Investigated generating solution descriptions in real-time with two different approaches for incorporating a classifier that determines when to perform generation
Thank you!

Code and data: https://github.com/panthap2/describing-bug-report-solutions
Contact: Sheena Panthaplackel <spantha@cs.utexas.edu>