ISSUE REPORT ASSESSMENT

Simon Curty
Bachelor Thesis
Issue Report Classification

? -> Orange Circle -> Green Circle -> Yellow Circle

Bug Report Quality Assessment

Green Badge with Checkmark
The Problem

Issue reports are used in many processes:

- Fixing bugs
- Bug triaging
- Issue assignment
- Project management
- Severity prediction
- Bug prediction
- ...

The commons release process (http://jakarta.apache.org/commons/releases.html) is a good starting place, but is out of date. When we do our own releases, there are some other steps particular to maven, the test-local and the webapp tests that must be documented.

Jeff Dever added a comment - 26/Jan/03 15:22

The first pass is in there, I'll refine it over time.
http://jakarta.apache.org/commons/httpclient/releases.html

Still need to link to it from the nav bar.
Misclassification of Issue Reports

It’s Not a Bug, It’s a Feature: How Misclassification Impacts Bug Prediction

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Abstract—In a manual examination of more than 7,000 issue reports from the bug databases of five open-source projects, we found 33.8% of all bug reports to be misclassified—that is, rather than referring to a code fix, they resulted in a new feature, an update to documentation, or an internal refactoring. This misclassification introduces bias in bug prediction models, confusing bugs and features. On average, 39% of files marked as defective actually never had a bug. We discuss the impact of this misclassification on earlier studies and recommend manual data validation for future studies.

Index Terms—Mining software repositories, bug reports, data

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROJECT DETAILS</strong></td>
</tr>
<tr>
<td>Maintainer</td>
</tr>
<tr>
<td>HTTPClient</td>
</tr>
<tr>
<td>Jackrabbit</td>
</tr>
<tr>
<td>Lucene-Java</td>
</tr>
<tr>
<td>Rhino</td>
</tr>
<tr>
<td>Tomcat5</td>
</tr>
</tbody>
</table>
Bug reports

- correctly classified
- misclassified

Issues

- actually a bug
- no bug

**It’s Not a Bug, It’s a Feature:**
How Misclassification Impacts Bug Prediction

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Goal

- Issue Report Classifier: A program that tells you, if an issue report describes a bug or not

- Better precision than reporters (over 66%)
Issue Report Classifier

Issue Report → Vectorization → FNN → Output
### Details

<table>
<thead>
<tr>
<th>Type:</th>
<th>Bug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority:</td>
<td>Blocker</td>
</tr>
<tr>
<td>Affects Version/s:</td>
<td>3.0 Alpha 2</td>
</tr>
<tr>
<td>Component/s:</td>
<td>HttpClient (classic)</td>
</tr>
<tr>
<td>Labels:</td>
<td>None</td>
</tr>
<tr>
<td>Environment:</td>
<td>Operating System: other, Platform: Other</td>
</tr>
<tr>
<td>Bugzilla Id:</td>
<td>31981</td>
</tr>
</tbody>
</table>

- **High priority:** 1
- **Version:** 1
- **Links:** 0
- **Code sample:** 0
- **System specifications:** 0
- **Patch:** 1
- **Documentation keywords:** 0

### Description

The combination of SSL tunnelling, host authentication, and disabled persistent connection support (HTTPD KeepAlive off) causes an infinite loop in HttpMethodDirector.

The problem has been reported on the httpclient-dev list by Rindress MacDonald <RMacDonal at enterasys.com>

### Attachments

- **ASF.LICENSE.NOT.GRANTED--auth.patch**
Vector Component Examples

• Stack trace
• Test cases
• Code samples
• Code reference (reference to a specific place in the code)
• Priority/Severity
• Keywords

• 23 in total
Vectorization

Issue Report

Stack trace heuristic

0

Code sample heuristic

1

Test case heuristic

0

Heuristic

(0, 1,..., 0)
FNN

Input layer  
Hidden layers
25 hidden nodes
Output layer
Experiment Setup

- 100 independent runs
- Dataset is split into 75% for training and 25% for testing (random sampling)
- Balancing of dataset
- Early stopping (max. 1000 epochs)
- Fixed learning rate of 0.1
Type: Issue category on tracker

Label: Issue category according to paper
Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bug</td>
<td></td>
</tr>
<tr>
<td>Precision</td>
<td>0.89</td>
</tr>
<tr>
<td>Recall</td>
<td>0.87</td>
</tr>
<tr>
<td>F1 Score</td>
<td>0.87</td>
</tr>
</tbody>
</table>

Precision, recall and F1 Score of the category **Bug** with binary classification over a dataset with **matching label and type**
Bug Report Quality

What Makes a Good Bug Report?

Thomas Zimmermann, Member, IEEE, Rahul Premraj, Nicolas Bettenburg, Member, IEEE,
Sascha Just, Member, IEEE, Adrian Schröter, Member, IEEE, and Cathrin Weiss

Abstract—In software development, bug reports provide crucial information to developers. However, these reports widely differ in their quality. We conducted a survey among developers and users of APACHE, ECLIPSE, and MOZILLA to find out what makes a good bug report. The analysis of the 466 responses revealed an information mismatch between what developers need and what users supply. Most developers consider steps to reproduce, stack traces, and test cases as helpful, which are, at the same time, most difficult to provide for users. Such insight is helpful for designing new bug tracking tools that guide users at collecting and providing more helpful information. Our CUEZILLA prototype is such a tool and measures the quality of new bug reports; it also recommends which elements should be added to improve the quality. We trained CUEZILLA on a sample of 289 bug reports, rated by developers as part of the survey. The participants of our survey also provided 175 comments on hurdles in reporting and resolving bugs. Based on these comments, we discuss several recommendations for better bug tracking systems, which should focus on engaging bug reporters, better tool support, and improved handling of bug duplicates.

Index Terms—Testing and debugging, distribution, maintenance, and enhancement, human factors, management, measurement.
SO_TIMEOUT parameter on the method level has no effect

Details

Type: Bug
Priority: Major
Affects Version/s: 3.0 Beta 1
Component/s: HttpClient (classic)
Environment: Operating System: All, Platform: PC
Bugzilla Id: 32742

Description

This bug has been reported on the HttpClient user list by Ilya Kharmatsky <ilyak at mainsoft.com>

Attachments

- ASF.LICENSE.NOT.GRANTED--so-timeout.patch 1 kB 17/Dec/04 06:19
Mismatch between what developers deemed important and what was provided by reporters.
Goal

• Bug Report Quality Estimator: A program that informs the reporter about the usefulness of the report

• Intuitive score as output

• Why would/should a reporter care?
Bug Report Quality Estimation

Bug Report → Vectorization → Bayesian Network → “usefulness” → Mapping → Quality Score (1-5)
Distribution of bug reports
Demo
Problems, limitations and future work

• Evaluation of Quality Estimator (missing ground truth)
• Issue Vectorization is language specific
• Some elements are hard to detect
• Motivation of reporters

**Future work:**
• Other languages
• Integration in issue tracking systems