The Comment Density of Open Source Software Code

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[Link: http://dirkriehle.com/2009/02/04/the-comment-density-of-open-source-software-code/]

Overview

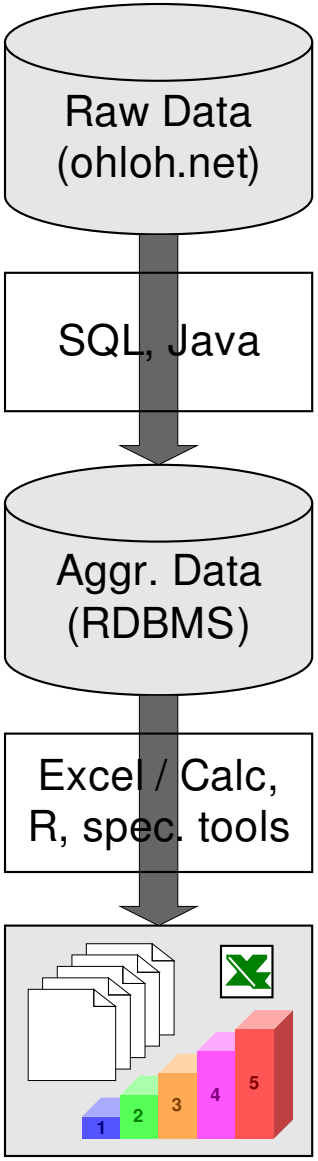
Summary (blog post): The Sweet Spot of Code Commenting in Open Source

[Link: http://dirkriehle.com/2009/02/04/the-sweet-spot-of-code-commenting-in-open-source/]

Abstract: The development processes of open source software are different from traditional closed source development processes. Still, open source software is frequently of high quality. Thus, we are investigating how open source software creates high quality and whether it can maintain this quality for ever larger project sizes. In this paper, we look at one particular quality indicator, the density of comments in open source software code. In a large-scale study of more than 5,000 projects, we find that active open source projects document their source code, and we find that the comment density is independent of team and project size, but not of project age. In future work, we intend to correlate comment density with project success or failure.

Reference: Oliver Arafat, Dirk Riehle. "The Comment Density of Open Source Software Code." In ***Companion to Proceedings of the 31st International Conference on Software Engineering*** (ICSE 2009). IEEE Press, 2009. Page 195-198. [Link: http://dirkriehle.com/2009/02/04/the-comment-density-of-open-source-software-code/]

Analysis Process and Tool Chain



Raw data source

- Local database (ohloh.net snapshot, crawled sources)
- Web services access (ohloh.net, sourceforge.net, others)

Pre-processing

- Database querying using SQL and scripts
- Java library for computationally heavyweight filters, aggregation

Aggregated data source

- Output of pre-processing stage for specific analytical tasks
- Aggregated data significantly improves analysis speed

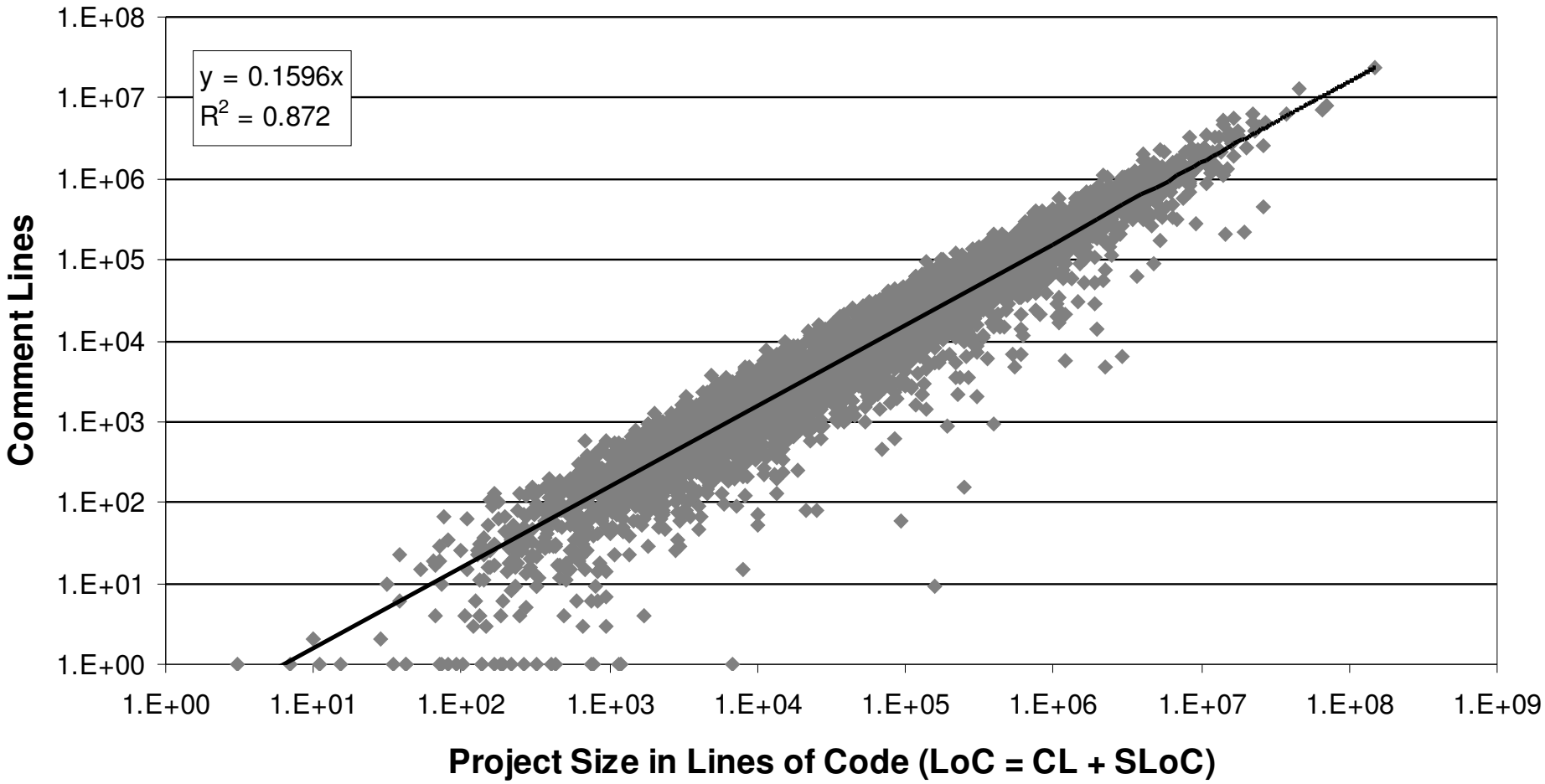
Analytical processing

- Mines aggregated (and raw) data for insights, hypothesis testing
- At present basic processing (Excel), machine learning next

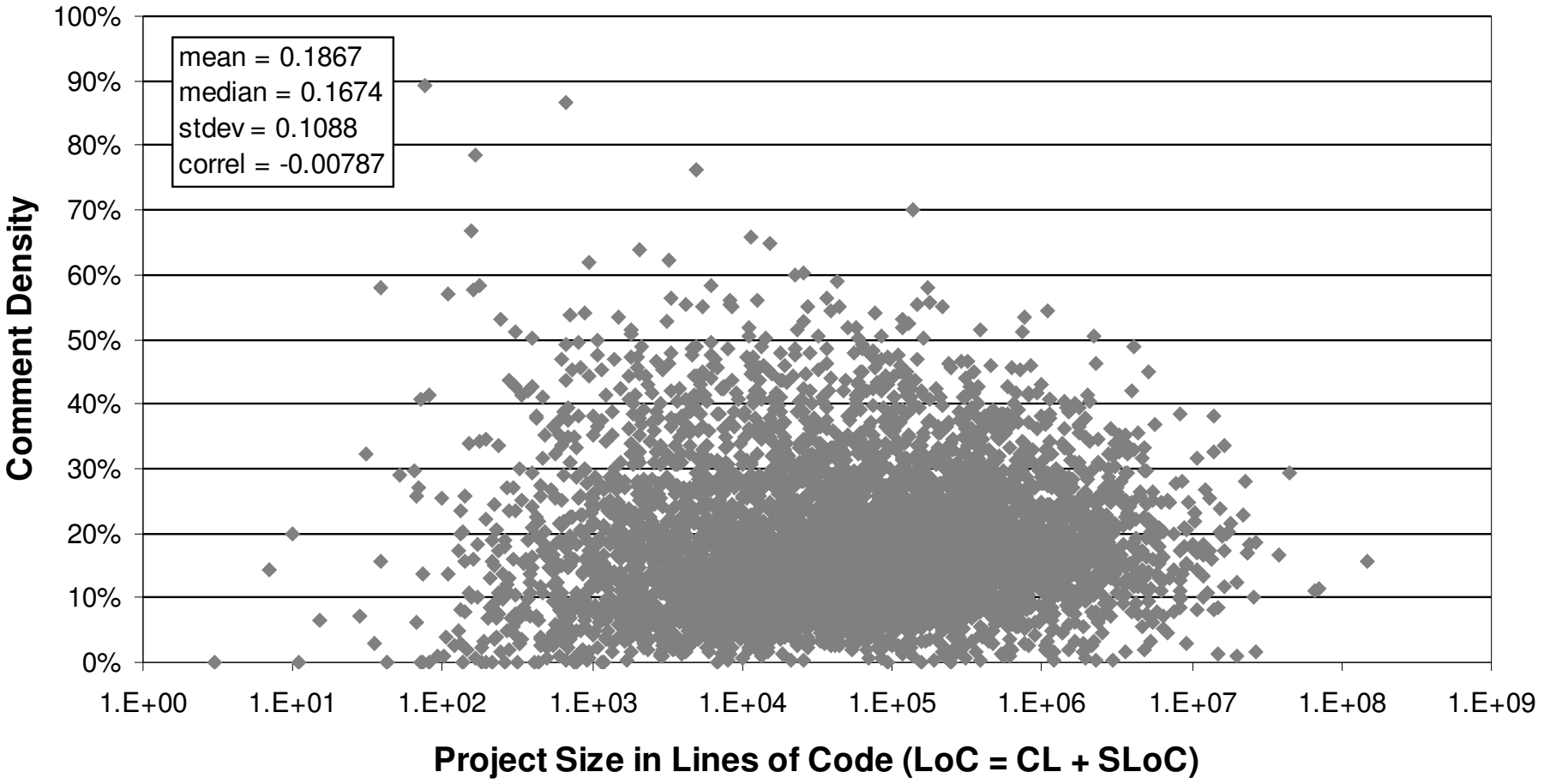
Analysis output

- Results of analytical processing: averages, distributions, correlations
- Presented as models, tables, graphs, charts, etc.

Commenting Practice in Open Source



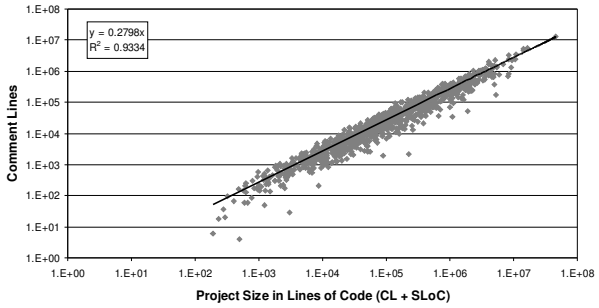
Comment Density

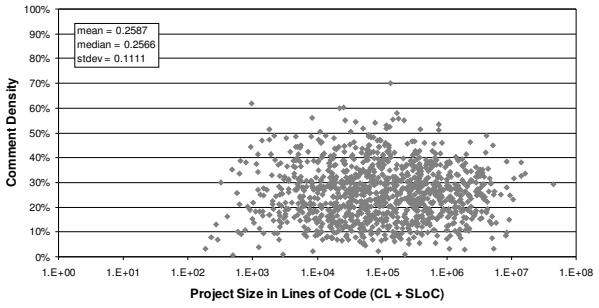


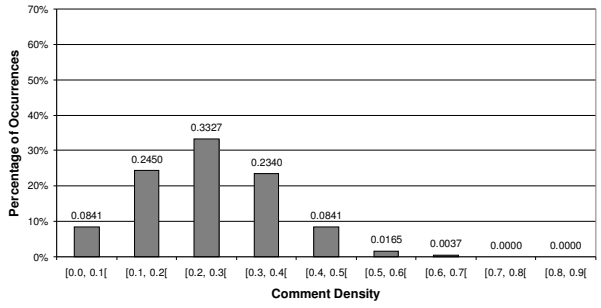
- **Comment density**
  - Percentage of lines of code that are comments
  - Measure of how well documented code is
  - Indicator of likelihood of survival
- **Definitions**
  - CL = comment lines
  - SLoC = source lines of code
  - CD = CL / (CL + SLoC)

Variation by Programming Language

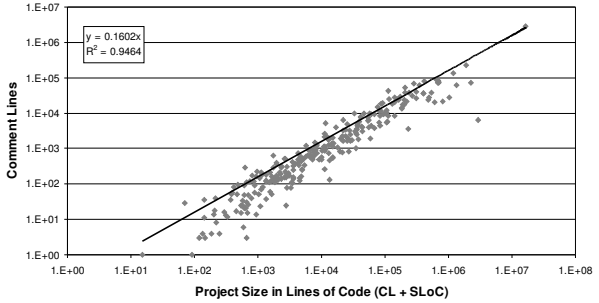
Java

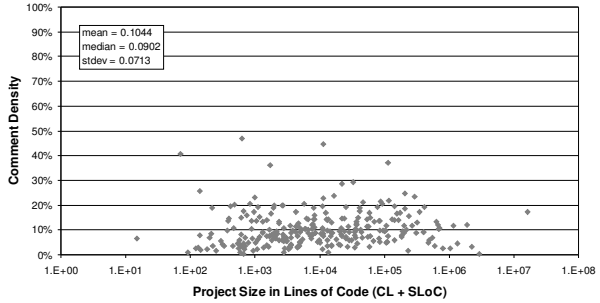


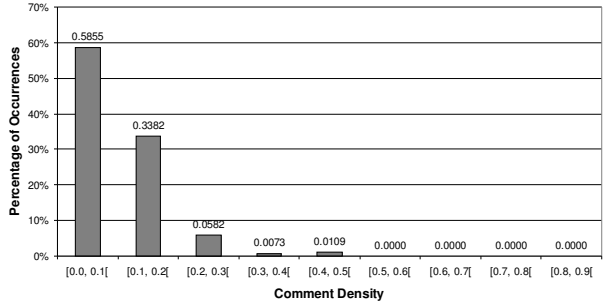




PERL



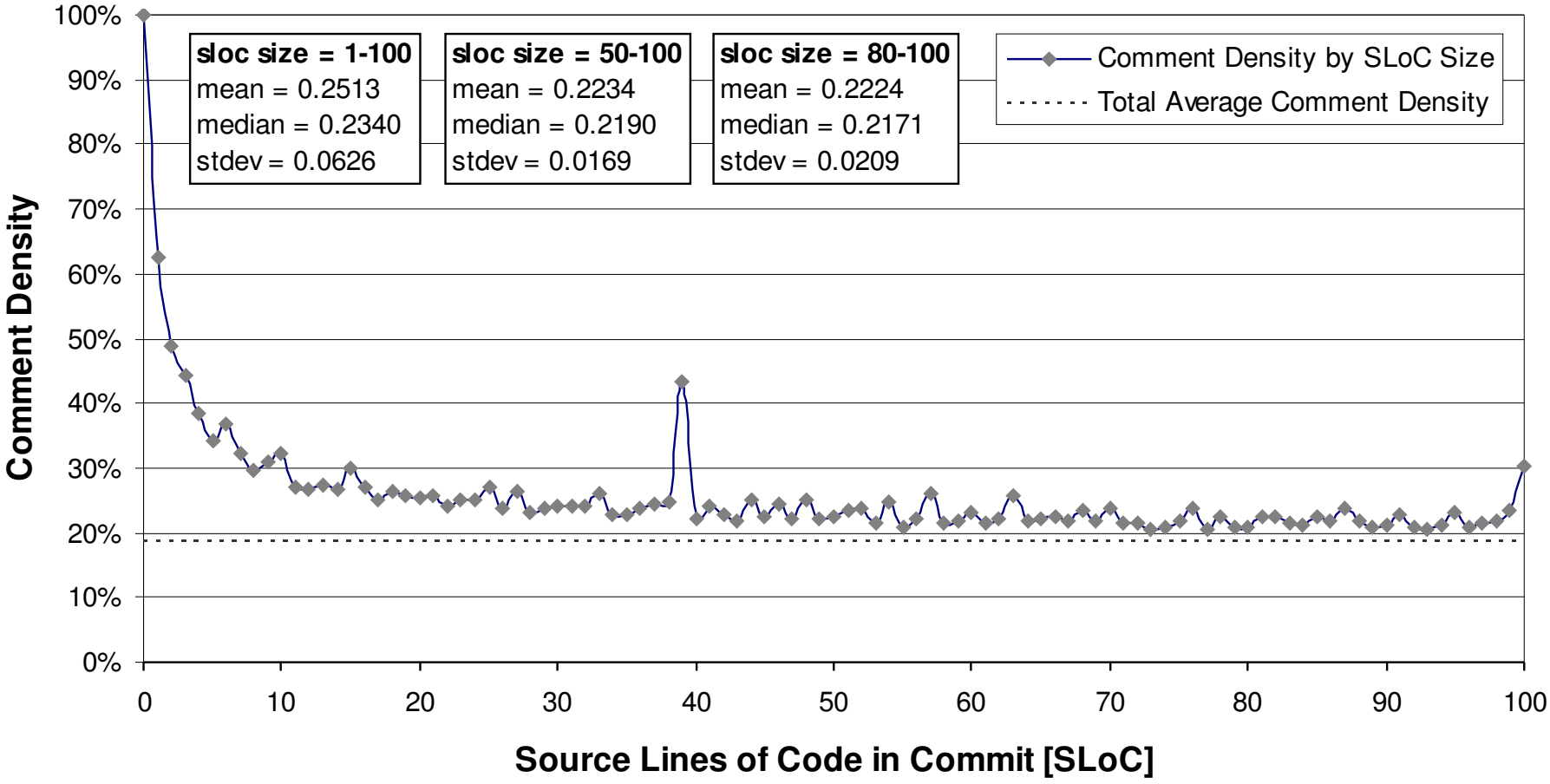




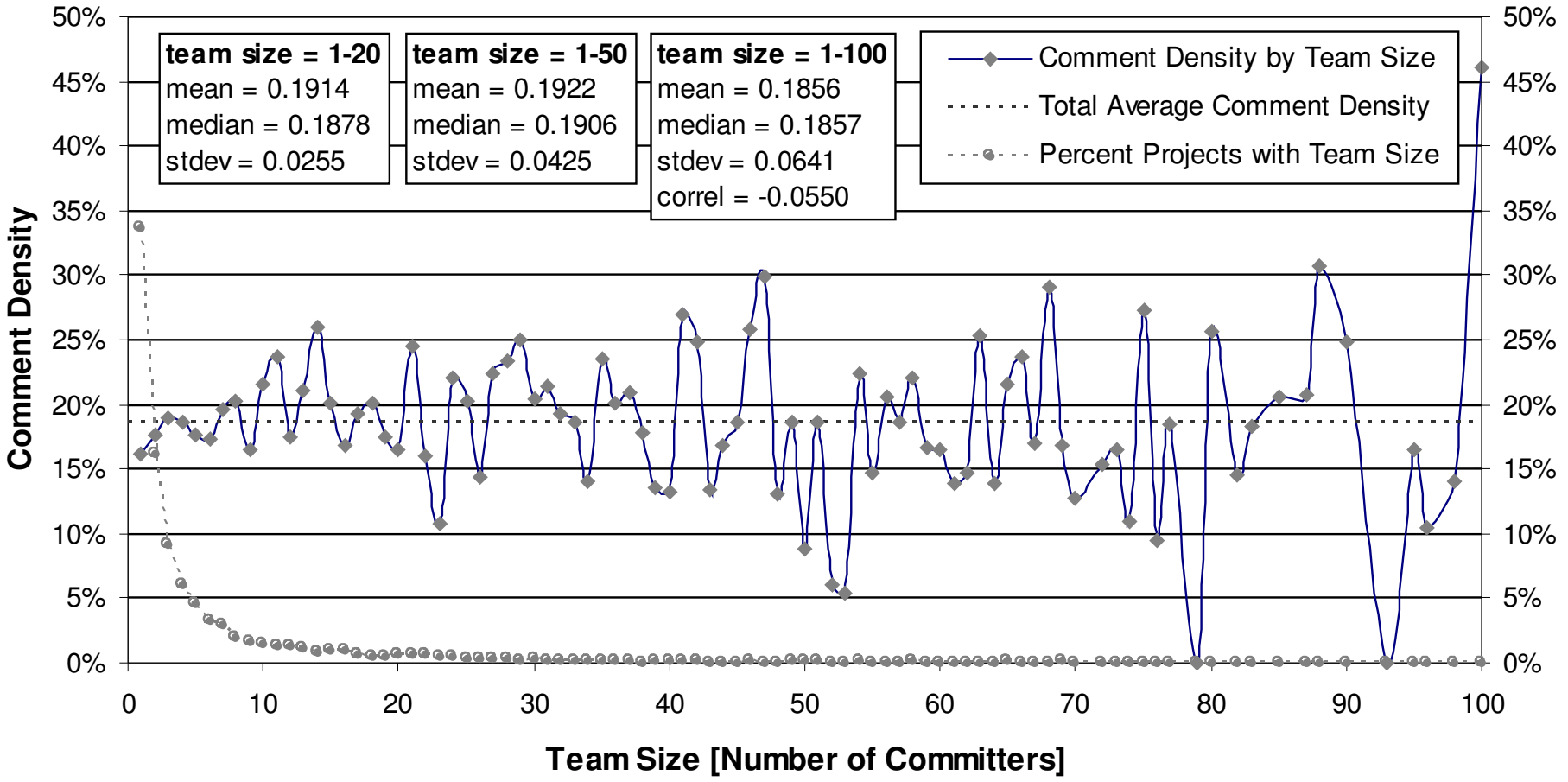
More here: How Open Source Comments (by Programming Language)

[Link: http://dirkriehle.com/2008/11/10/how-open-source-comments-by-programming-language/]

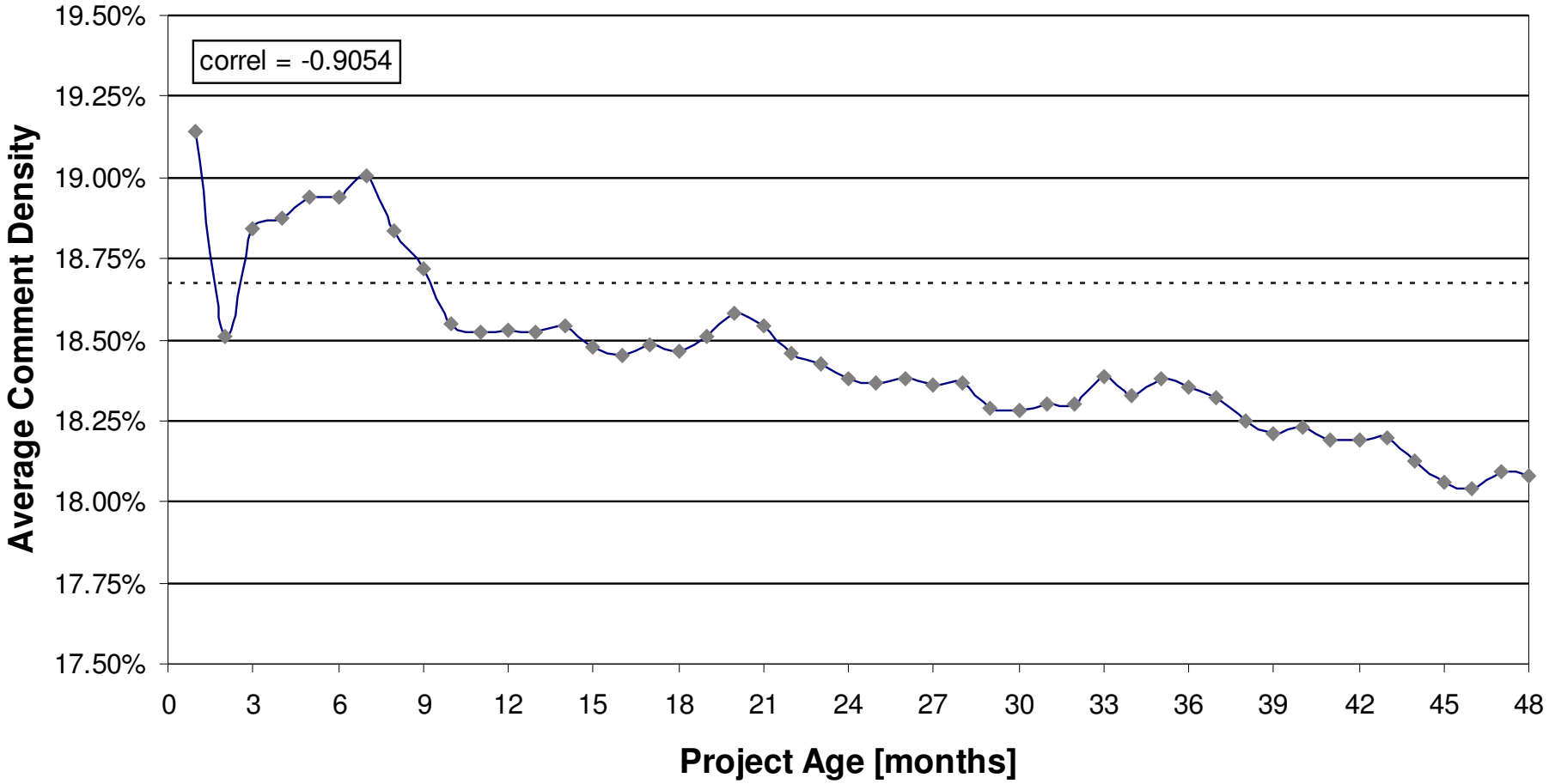
Comment Density by Commit Size



Comment Density by Team Size



Comment Density by Project Age



Commenting Practice Summary

- Successful open source projects follow a consistent commenting practice
  - 1 out of 20 commits serves commenting purposes only
  - 1 out of 5 non-empty lines is a comment line
- Average comment density is independent of project size
- Average comment density is independent of team size
- Average comment density slowly falls with project age

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Thank you! Questions?

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