Exploratory Analysis of Emotions in Computer Engineering

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ABSTRACT

This report mainly discussed the impacts of different emotions may have on coding efficiency. We use both quantitative and qualitative analysis to find the results. For the quantitative analysis, we investigate the open-source repositories, mine the emotion hidden inside the commit messages and find the relationship between emotion and coding efficiency. For the qualitative analysis, we make some interviews with software engineers from dot-com companies, research teams and open-source community. Besides, some participants also shared their project emotional experience on other engineer-related approaches, which indicates some general clues of emotion impacts in computer engineering.

KEYWORDS

Emotion Mining, Coding Efficiency, Computer Engineering

1 INTRODUCTION

With the continuous development of the social economy, the development of software engineering technology has made people's lives more convenient, and has also driven the development of many other industries. With the wide application of various software, people pay more and more attention to software engineering technology, and its practical application scope is also expanding. In order to meet people's requirements for high-quality life, software engineering technology must accelerate its development. Demand and development promote each other, making the software development industry continue to innovate. The newly generated technology also provides many jobs for society. At the same time, the software development department has a growing voice in Internet companies. More and more company managers are developed from the original junior or senior software engineers in the company. Many companies also set generous benefits and salaries for software engineers.

However, behind the exquisite web pages, complex and diverse software functions and decent salaries are the sweat and day-and-night hard work of software engineers. While well-paid, many software engineers are under pressure. Because Internet companies have put forward requirements for software engineers to work efficiently when developing software, it is necessary to compress the development time of software systems to minimize the development cycle of software. In the process of software development, iterative development has become an important content, which requires software engineers to have stronger testing capabilities and coordination capabilities. This places high demands on the software engineers' ability to adjustment, iterative development, and teamwork. Being in a state of high stress for a long time, developers are also very easy to become anxious and depressed.

In order for the company to have a strong competitiveness, Internet companies require employees to maintain high work efficiency. Additionally, in order to ensure the mental health of employees, a lot of companies have begun to pay attention to the mental health of employees. Some Internet companies regularly hold departmental activities to enhance the relationship between teams. A few Internet companies even set up special psychological counseling rooms for employees to relieve psychological pressure.

However, few previous papers have specifically explored the relationship between software engineer emotions and productivity. Indeed, there are a few papers discussing the relationship between positive mood and work efficiency. But the participants are not software engineers, and the research results may not be applicable to the field of software engineering. In addition, the relationship between positive and negative moods on work productivity has rarely been explored simultaneously.

2 LITERATURE REVIEW

Detailed information of definition of emotions, categorization and emotional mining.
Major references are:[4],[3],[6],[10],[8],[9],[1],[7],[2],[5].

2.1 Definition & Categories of Emotions

The definition and features of emotions from a psychological aspect. Using a consistent categorization standard to analyze the emotions. Explain the categories and the words which belongs to these emotions. In this part, we will discuss definition from wikipedia[6], the Ekman emotion framework[3].

2.2 Emotion and productivity

In this part we will discuss how does emotion affect productivity. The papers are [5],[2],[7],[1],[8]

2.3 Emotional Mining

Introduce the emotional mining methods used in github. The papers discussed in this part are [9],[10],[4].

3 RESEARCH QUESTIONS

There are a number of research questions we plan to figure out through the research.

- How do we define and categorize different kinds of emotion?
- How do we know engineers' emotion from their codes?
- How do we measure the efficiency of coding?
- Does the emotion change have impact on the efficiency of coding?

- What effects will the emotion change cause on coding efficiency?

4 METHODOLOGY

We will collect and analyze our data in both qualitative and quantitative ways.

4.1 Study 1: Emotional Mining

4.2 Study 2: Semi-structured Interview

We design a semi-structured interview to do qualitative study to explore the relationship between emotion impacts and coding efficiency on the subjective perspective. Besides, we also tried to figure out the potential factors which influence the emotional status of people during the project in order to give suggestions with reference values to both employers and team leaders.

Since the interview aims on evaluating influence, express and outcome factors, we propose several types of factors which we will focus on in the interview designing and analysis. For the influence factors, we searched some typical reasons and did brief talks with some engineers other than the participants, we finally introduce the following influence factors:

- Project Factors
- Social Factors

TODO

We plan to interview 10-20 participants from different regions about their project experience. We will ask question to investigate their emotion status along the project working procedure, and infer the internal and external factors leading to their emotion status correspondingly. Our participants should comprise of software engineering related people from different specific divisions, for example, machine learning, backend developing, quality assurance engineering, UI/UX designing and etc. To achieve in more general and comprehensive conclusion, we also select participants from our own social network and engineer community, including employees at different degrees in Internet companies, graduate students, and open-source developers.

TODO

5 EMOTIONAL MINING

6 INTERVIEW

Practically, we recruit 16 participants overall from diverse regions, status of employment and division background. For the composition of respondents, 11 of them are from East Asia and 5 are from North America, while 9 of the participants choose not to disclose the full scripts of interview due to contents involving confidential issues, and rest of the scripts are included in the repository of our project on GitHub.

All the participants are currently or formerly engineering occupied, and they may or may not share their experience in engineering related or unrelated divisions. For the further evaluation and analysis, we asked participants for permission to record audio

Table 1: Composition of Participants

Employment Status	Number of People	Perception
Graduate Student	4	25%
Junior Engineer	4	25%
Senior Engineer	3	18.75%
Open-source Developer	5	31.25%
Overall	16	100%

7 DISCUSSION

8 CONCLUSION

9 ACKNOWLEDGEMENT

10 FUTURE WORK

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