Homework 7: Planning an experiment

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Does using a microservice architecture increase reliability of systems, compared to using a monolithic architecture?

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See bilbiography for articles. [2] [3]

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Companies that use a microservice architecture have fewer reported bugs on average, compared to compaines that use a monolithic architecture.

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The variable used to measure the hypothesis could be number of reported bugs. A larger number of reported bugs would indicate less reliability, and fewer reported bugs more reliability.

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I would group software companies so that they are of approximate equal size when being compared. Then I would train a logistic regression model on data containing information about the number of reported bugs on average at a large number of different companies, and whether they use a monolithic or microservice architecture. Finally, I would try to predict whether a company uses monolithic or microservice architecture based on their number of reported bugs.

6

There are a number of statistical methods that are appropriate when comparing a discrete variable to a continuous one such as point biserial correlation, logistic regression and kruscal wllis h test to name a few. To use point biserial correlation the continuous variable must be normally distributed and homoscedastic. [1] We don't have enough knowledge about the data at this stage to make such assumptions, which renders this particular method inappropriate. However, there is no such need when using logistic regression, which makes it an appropriate choice for statistical evaluation [1].

7

We would need a large data set to train the model and make accurate predictions. Companies are not obligated to share data like this. To carry out this experiment, access to this data is needed, and from a large number of companies. Their willingness to share their data, could potentially be a boundary to carry out this experiment.

8

I would say that the most applicable objection is fallacy number 5, "There's too much noise in the way". It's very difficult to isolate a single variable like the number of reported bugs on average, and claim that this variable would somehow illustrate the reliability of a system. There are probably too many other variables that differs among software companies for a single variable to be successfully and accurately mapped to the phenomenon that you want to measure.

References

[1] *An overview of correlation measures between categorical and continuous variables.* Sept. 2018. URL: `https : / / medium . com / @outside2SDs / an - overview - of - correlation-measures-between-categorical-and-continuous-variables- 4c7f85610365`.

[2] Antonio Bucchiarone et al. "From monolithic to microservices: An experience report from the banking domain". In: *Ieee Software* 35.3 (2018), pp. 50–55.

[3] Wilhelm Hasselbring and Guido Steinacker. "Microservice architectures for scalability, agility and reliability in e-commerce". In: *2017 IEEE International Conference on Software Architecture Workshops (ICSAW)*. IEEE. 2017, pp. 243– 246.