15-839A

What Makes Good Research in Software Engineering?

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Suggestions on Analyzing Papers

We are reading to understand both the result reported in the paper and the research method used to get the result.

Since the papers are in the area of software engineering, we can reasonably expect that they address problems of practical interest -- so analysis of the paper should trace the chain of reasoning from the motivating problem through the solution and back to the impact of the solution on the motivating problem.

Often the real-world setting is too complex to serve well as a research setting, and an idealized version of the problem is chosen for the research setting. This idealization should be well-connected to both the motivating problem and the research result.

Here are some useful questions to ask about a paper. This list can often serve as an outline for a summary.

> What kind of problem is the paper solving? Some possibilities are
>
> > Feasibility: Is X feasible at all?
> >
> > Characterization: What is the nature of X? What are its important properties? What are the varieties of X, and how do they differ?
> >
> > Method or mechanism: What is a general method to accomplish X? What tools or automation make it easier to accomplish X?
> >
> > Prediction: What information predicts X, and in what way?
> >
> > Selection: Under what circumstances is X preferable to Y?
>
> What's the real-world setting or motivation?
>
> What's the research setting?

How is it related to the real world?

What is the research hypothesis?

What is the research strategy?

What's the result?

How does it solve the problem in the research model?

How does it satisfy the research hypothesis?

Do you believe the result, and why?

On what evidence?

What steps did the researcher take to show that the result is valid?

How does the result map to the real-world setting?

How mature is the idea? the result? What other results are needed to make it useful?

Some of the papers we're reading are surveys. These may be hard to summarize in the above form. If so, summarize the results they compare and describe the basis for the comparison. On the other hand, some papers that resemble surveys are actually making a research contribution in the form of a model that synthesizes earlier results. In such cases the synthesis itself is a research contribution.