

Essay on Research Methodology

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1 Introduction

The many research methodologies mentioned and discussed were interesting and gave a nice overview of the various fields of science. Being in the control department and having studied engineering for most of my adult education, I believe I have mainly been exposed to and use the scientific methodology for most of my work. This has also been consistent in the initial literature review I have done. As I am conducting research in a field closely related to computer science the papers I read tend to have a certain format and flow to them.

I am currently working on feedback computing. The current project involves fair bandwidth allocation in a system connected through a local connection. With the rapid advancement in the number of devices connected to the internet the amount of available bandwidth is under a lot of stress. This is mainly due to physical limitations on hardware. Thus there is a need to make sure that the devices connected are allocated the appropriate amount of bandwidth and also take care that other devices do not suffer. Say that we have a safety critical application, like an exhaust valve that has to be opened with a signal approximately every hour, connected to the same network as a surveillance camera. It is necessary to allocate good bandwidth to the valve but it does not make sense to allocate it the same all the time. I am working on a similar allocation and optimization problem.

2 Current Research Methodology and Motivations

The research methodology I have come across follows this general layout which is similar to the scientific methodology. Initially you start by recognizing a problem or an area of improvement that is possible in the field. You come up with a hypothesis or a method for the said problem. You conduct some simulations or experiments to validate your hypothesis or method. This has also been the general methodology that I have been following till date. In discussions with my supervisor we have come up with an idea on how to tackle the aforementioned bandwidth allocation problem. After an initial literature review I am currently

in the process of writing the software code and setting up the hardware required to test our hypothesis. After that we plan on a comparison study to other similar methods and publish our findings.

It also makes sense to use this methodology as the methodology has been used for a while now in computer science research and is followed by many. It is also easier for new comers to quickly adapt if a certain procedure is followed. If the methodology of research in a particular field keeps varying then it is not only hard for people to follow what is going on in the field but people will end up reinventing the wheel again.

3 Ideas for Future Research Methodology

There are also valid reasons to try other methodologies. After all research is a way of inventing and finding new things and this objective can be very hard to attain if everyone is doing research in a similar way. In my own personal scenario I have already in mind to work for a while with the research methodology followed in the mathematical field as control theory is also a very mathematical field. The mathematical method has already been used for a while in control theory and has been proven useful. Although I am not very familiar with this method, I have read a few papers which followed this and I think it can help give me a new outlook on my research. It would be interesting in trying to mathematically model the current research problem. Coming up with a set of equations to describe the problem is a non-trivial and challenging task.

Also other methodologies that I think will be interesting are the case and field studies. I believe this has not been very widely used and the products or methods used in research are very rarely applied in the real world or industry. It will be interesting if possible to do a case study or a field study on how some of the ideas or theory used can be put to action and their long term use and support. I believe this is somewhat referenced to in the artifact evaluation mentioned in one of the optional papers for the course. The process of making code used for research more accessible and reproducible makes it possible for rapid advancement in research.

In conclusion I think it would be interesting to apply methodologies other than the ones usually used and I will try and use one of the methodologies mentioned above in my research.