2020 The GitHub Arctic Code Vault was created to preserve open source software. This data repository is stored in a decommissioned Norwegian coal mine.

ADVICE

Help!
I Need an Idea for My Dissertation

Getting into a Ph.D. program is the easy part. The question now becomes, how do you develop ideas for your dissertation? Many students drop out before the dissertation phase because they cannot confidently turn an idea into a dissertation problem. This column seeks to create a conversation about generating mindsets about the "in-between" stage: dissertation ideas. For this column, we share what can be useful for graduate students and research advisors in all phases of academia.

If you are a current doctoral student, or a student enrolled in a master's or undergraduate program, this advice can be beneficial to you for developing research projects.

Question 1: Choosing a topic. The field of computer science is full of endless possibilities and has high overlap with other disciplines. With so many options and so little time, how can someone decide which field to conduct their dissertation research in?

Advice: If faced with the challenge of being interested in many topics, the solution could be as simple as finding a way to merge a few subjects together. At the intersection of fields and disciplines, are the opportunities to discover innovative techniques. However, this also can bring rise to complex and unprogressive projects.

If faced with the challenge of not being interested in any topic, the student should explore various fields. Utilize internship experiences, research talks, conferences, and recent papers as a catalyst to explore possible interest in computer science. Find something that will spark your interest and hold it for a long time. But nevertheless, al-

ways be open to suggestions for topics from professors and colleagues.

Question 2: Creating dissertation ideas. Students may continually struggle with creating a solid vision for their dissertation. Students may have worked on several projects, changed advisors, or completely changed their research direction. While developing their dissertation, students may wonder: How do I create an idea for my dissertation? What do I do when I am having trouble finalizing which route to go?

Advice: When choosing a dissertation idea, your interest scope will become narrower and more focused. As a researcher, you should become well versed in your topic(s) of interest. Continue reading relevant literature about what has been done in the field(s) to find gaps and limitations from those studies. It's normal to have several topics of interest before settling for one; continue to keep a list of your interests, old and new. If faced with the challenge of not knowing which topic to

choose, keep in mind that the dissertation must: 1) be manageable in size, 2) have the potential to make an original contribution of knowledge, and 3) be completed in a given time frame and budget.

Question 3: Solidifying research questions. Now that you have a dissertation idea, you must find research questions to investigate on that topic. These specific questions can take time to discover, but how do you begin to ask research questions to support your dissertation topic?

Advice: You might develop multiple research questions, but each question should be clearly connected and focused on the scope of the dissertation. Creating the perfect research questions takes time and several updates. Think about what you are trying to investigate and how those solutions will contribute to added knowledge to begin. Research questions can seek to understand different trends or purposes of the topics, such as 1)

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describing characteristics and exploring contributing factors, 2) explaining phenomena and testing strategies for resolution, or 3) evaluating behaviors and a call to action. The way you frame your question depends on what your research aims to achieve.

Question 4: Defining novelty in the field. As a researcher, it is your intent to contribute valuable and novel work to your respective field. Whether a novice or expert, defining your research's novelty can be a long, tedious task. Many students tend to have daunting questions lingering over their heads: How do we define novelty or contribution to a field? How to know that an idea will be novel? How to position your dissertation so that it stands out?

Advice: The critical point of a dissertation is to create an original body of work that contributes to knowledge in that respective field. The topic should not be a cookie-cutter project from an issue that has been researched repeatedly. The concept of novelty can derive from the methodology, algorithms, and findings. Find a hole, gap, or an intricate missing piece that can enhance the body of work that already exists.

Note: All the discussed points in this article are the opinion of the author. None of the topics are associated with the industry, a university, project managers, professors, postdocs, or Ph.D./M.S./B.S. students.

Biography

Jasmine DeHart is a doctoral candidate in the School of Computer Science at the University of Oklahoma Gallogly College of Engineering. DeHart obtained her master's and bachelor's degrees in computer science from the University of Oklahoma and Philander Smith College, respectfully.

The Amalgamation of Technology and Sustainability

Technological innovation can play a significant role in mitigating environmental issues. It has become necessary to adapt sustainable development practices personally and in business. Doing this will not only help replenish Earth's natural resources but also protect future generations.

2008 Tesla launches Roadster, the fastest electric car in the world, majorly disrupting the traditional car industry. It is the first fully electric eco-friendly sports car.

2013 Eijiro Miyako, a Japanese engineer, develops an autonomous drone robotic pollinator that aids artificial pollination and boosts the quality of crops. It uses GPS, high-resolution cameras, and AI for its functioning. The major reason to develop this robot was to meet increased food production needs and overcome setbacks caused by declining bee populations.

2016 Graviky Labs of India develops Air-Ink by extracting harmful byproducts, such as carbon particles from car exhaust fumes, to produce pen ink. Graviky's mission is to control increased air pollution levels in the atmosphere.

2017 BHS launches the Max-AI AQC recycling robot, which uses computer vision, deep learning, and AI for the identification and selection of recyclable items, such as plastics from debris. It is a cost-effective and fast method for recycling materials for future use.

2020 Panasonic develops the Cosmos Healthy Home system that filters and monitors the air inside your home using strategic ventilators and sensors. It improves air quality by killing bacteria and viruses.

—*Manandeep*