How to Do Research and Survive the Research Woes

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“How many times I have wished that I could look out onto the world through the eyes, with the mind, of a chimpanzee. One such minute would be worth a lifetime of research.” Jane Goodall
What is Research?

- Research is the art of doing a piece of work that moves knowledge **forward** and helps us understand ourselves and the world around us better.
- Research is a **struggle** with ourselves.
- Research is a way to keep your brain young.
- Research is part of our life and does not start at 9am and finish at 5pm.
“Good Research”

- Research needs a problem.
- Research sometimes raises new issues.
- Solutions are not as important as the path to them.
- Problem formulation needs exposure to a variety of topics.
- Take many classes and open yourself to new and erratic ideas.
- Question everything.
- Step back and evaluate your work often.
- Understand previous related work.
“Questionable” Research

- Work that is not focused.
- Work that misses the big picture.
- Work that answers too few questions.
- Work that cannot summarize its contributions in a few sentences.
- Work that is not grounded in the literature.
- Work that is only done to enjoy the comforts of the student life.
The advisor-student relationship is crucial and lasts a lifetime.

The right chemistry is important.

Be clear about your goals and state them to the advisor.

Do a small project with him/her before you commit.

Be clear about future financial support.

Have regular meetings, especially at the beginning.
Problem Formulation

- Tough part.
- Advisor is essential at this phase.
- Literature survey.
- Depression often dominates this step.
- Start small and do not expect to solve the "Computer Vision" problem.
- Look at earlier theses.
- Back out early from problems that seem unrealistic.
- Do a TA’ship in order to explore other research opportunities.
Read a lot, especially at the beginning.
Use resources such as CiteSeer, INSPEC, IEEE Xplore, and the ACM Digital Library.
Attend conferences and workshops and ask a lot of questions.
Talk and exchange emails with people who have done or are doing similar work.
Ask your peers.
Organize the references with comments. Three years down the line when you need the information, you will not recall the details.
WPE

- Breadth and depth of knowledge are important.
- Look for research topics and issues.
- Projects help a lot.
- Stress for the WPE is natural. Do not overdo it however.
- Work in groups helps.
Papers

- Papers help you set doable goals.
- Papers are important for future employment.
- Create a structure before you start (abstract, introduction, problem statement, related work, solution, results and analysis, conclusions, and future work).
- All the words and sentences should be your own.
- Minimum overlap between your papers.
- Use of spell checker is essential.
- Give plenty of credit.
- Order of authors.
Proposal

- Clear ideas about problem and previous work.
- Helping advisor writing grant proposals is a good experience.
- The main theme should be summarized in a paragraph.
- There always differences between the final thesis’ topics and the proposal’s topics.
- Timeline and priority ordering are essential.
Conferences

- Networking is important part of the research enterprise.
- Group presentations help before conference presentations.
- Think of the audience in front of you as a bunch of your friends.
- Think before you answer questions.
- Tough questions can be deferred after the talk.
- Practice, practice, and practice your talk.
The last mile of the marathon runner. It might be painfully boring. It is your legacy. People thirty years down the road will still look at it. Start the writing early. Combine the writing with some research work. Push your advisor to give you feedback early.
Life Afterwards

- Academia vs. Industry.
- Start the networking and the search early.
- Create a plan. Do not apply simultaneously for all types of jobs.
- Create a couple of different interview talks.
- Practice the talks.
- Recommendation letters are important.
- Student memberships (e.g., IEEE) help.
- Invite yourself to give talks at places you are traveling.
Time Management

- Time flies.
- Organize your days around small and doable tasks.
- Do not stress over the final result.
- Social life is important.
- Paper deadlines help.
Conclusions

It is a tough and demanding job but you never get bored
To the more than 60 research assistants of mine, I owe a lot. I learnt something from each one of them.