Preparing for Fellowships

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About Me

• Undergraduate:
  – Lehigh University
    • B.S. in Computer Science (Engineering)
      – Focus: Artificial Intelligence / Data Mining
    • Minor: Cognitive Science

• Graduate:
  – Rutgers University
    • PhD in Computer Science
      – Focus: Computer Vision and Machine Learning
Main Ways of Paying for Grad School

• Teaching Assistantship
• Research Assistantship
• General Assistantship
• Fellowship
Why Aim for a Fellowship?

• Greater freedom in research
  – Less strain on advisor’s budget
• Typically higher paying
• Prestigious
• Good practice for grad school application preparation
  – Also might develop some skills for grant writing
Most Popular American STEM Fellowships

• National Science Foundation Graduate Fellowship
  – NSF GRFP

• National Defense Science and Engineering Graduate Fellowship
  – NSDEG

• The Hertz Foundation Graduate Fellowship
Some Other Fellowships (For CS)

- AT&T, DOE, Facebook, Google, IBM, Microsoft, NASA, NPSC, Samsung, Symantec, Yahoo, etc.
Requirements

• GRE (not for NSF GRFP)
• Transcripts
• Letters of Recommendation
  – Typically 3-4
• Essays
  – Research Statement
  – Personal Statement
• Successful Completion of a Bachelors Degree
Deadlines

• Hertz: Typically late October
• NSF: Typically November
• NSDEG: Typically late December, early January
NSF GRFP

• ~14,000 Applicants
• ~2,000 Fellowships Offered
• Three years of support
  – $32,000 per year
  – $12,000 cost-of-education allowance
  – Additional support for international and professional development opportunities
  – XSEDE supercomputer access
Requirements

• US Citizen
• Graduating senior or first/second year grad student
• Entering a scientific, research-based graduate program (excluding medical school)
Major Themes of the NSF

• Intellectual Merit (IM)
  – Why you’re qualified academically/scientifically
  – How your research benefits the scientific community

• Broader Impacts (BI)
  – How you have/will promote(d) science to the general public
  – Outreach
  – How your research will impact the world at large
  – How your research will connect a global population

• See NSF GRFP website for more details
Major Themes: Tip

• Almost every applicant is qualified based on the intellectual merit criteria; make sure you remember to also stress the broader impacts criteria
Educational Background / Experience

• Coursework (IM)
  – Challenging, relevant classes
    • Do well in these classes; show you’re capable of graduate-level work

• Research Experience (IM)
  – REUs, independent studies, research-based internships, senior projects, etc.

• Other Relevant Experience (IM/BI)
  – Relevant internships/ work experiences (e.g. Google)
  – Open source contributions
  – Teaching/tutoring/mentoring experience, outreach, etc.

• Academic awards, scholarships, published/presented work, etc. (IM)
My Educational Background / Experience

• Coursework (IM)
  – 1 Grad-level class in pattern recognition
  – Many other upper undergrad-level/lower grad-level classes in AI and probability/statistics

• Research Experience (IM)
  – 2 REUS: (1) Robotics and (2) Vision
  – 3 Independent Studies: Data Mining/Pattern Recognition
  – 1 Senior Projects: Bioinformatics/Vision/Graphics

• Other Relevant Experience (IM/BI)
  – Secretary and Event Coordinator of Lehigh’s ACM (Programming Club)
  – Tutor/mentor to underprivileged middle- and high-school students
  – Assistant at various science camps/ afterschool programs

• Academic awards, scholarships, published/presented work, etc. (IM)
  – 2 Published papers, a few more in the works
  – Scholarships, various academic awards
Future Plans

• Proposed Institution
  – Your ideal graduate program
  – Not held to this choice if awarded fellowship
  – Should be able to justify strengths of program

• Fields of Study
  – Primary Field: The field you want to work in
    • e.g. Computer science
    • VERY IMPORTANT! This determines who reads your application, and it is difficult to change this after you’ve been awarded the fellowship
  – Secondary Field: The subfield you want to work in
    • e.g. Data Mining/Information Retrieval
    • Important because it also determines who will read your application
    • Strongest when it can be tied in with past research experience
Letters of Recommendation

• How to select:
  – Most Important Factor: Pick people who know you well and have supervised you in a research setting
  – Secondary Factors:
    • A well-known, well-regarded researcher is typically a plus
    • A letter from an outside collaborator (e.g. an REU supervisor at a non-home institution) might be slightly beneficial
  – Tip: Avoid “did well in class letters”
  – Tip: The NSF GRFP lets you select more than the required number of recommenders in case one isn’t submitted on time. You might want to ask for an extra recommendation in case one recommender is unable to submit for some reason (but note this causes extra work for that recommender)
Letters of Recommendation

• Provide a resume, a brief list of strengths to talk about, drafts of your personal and research statements, and a summary of the work you did for them including notable results and achievements

• Remind recommenders to discuss the broader impacts of your work in addition to its intellectual merit

• Tip: Don’t forget to thank recommenders
Essays

• Two essays required:
  – Personal statement, relevant background, and future goals
  – Graduate research statement
• 3 pages maximum for personal statement
• 2 pages maximum for research statement
• Very strict formatting guidelines!
  – Failing to adhere to guidelines can get your application immediately thrown out of the pool!
• Perhaps the most important part of the application (along with recommendations)
  – Only time you can express your personality, passion, etc.
  – Only time you can explain past and future work in detail.
Personal Statement

• Why do you want to pursue a graduate education in a scientific field?
• Why do you want to pursue a research path in your given subarea?
• Past research (IM)
  – What you did
  – Successes
    • Mention any published results
  – What you learned from each experience
  – The IMPACT of your work (in the scientific community and towards the general betterment of the world)
  – Collaborations and international components
• Past leadership, teaching, and outreach initiatives (BI)
  – How have you promoted science to the general population?
  – How will these experiences prepare you to promote science in the future?
• Future goals
  – e.g. I want to be a professor/research scientist/etc.
  – How you will use your future position to promote the sciences
• Tip: Build a narrative
Research Statement

• Discuss a plan for a research project you want to pursue
• Project should be feasible, impactful, and realistic
• Break the problem down into:
  – Discussion of the problem
    • What it is
    • Why it’s interesting in general
      – Broader Impacts and Intellectual Merit
    • Why it’s interesting to you specifically
    • Why you’re uniquely qualified to pursue it
  – Method(s) for addressing the problem
  – How you’ll evaluate your method(s)
• Statement should be technical, but not overly technical
  – Reviewers will likely be from your field, but not necessarily your subfield
Research Statement (Tips)

• Discuss your research idea with your advisor and have them read over your proposal
• Reference relevant materials (i.e. seminal papers relating to the problem)
• Pick a project that you know something about
  – Extend your past research
  – I took a proposal for a class project that was never implemented and then modified, condensed, and revised it into my final NSF proposal
  – You aren’t bound to the project if you’re awarded the fellowship
    • My proposal was on a web mining system, but I’ll be working in a computer vision lab
• Be innovative
• Don’t forget the broader impacts and intellectual merit criteria!
• It might be helpful to tie the proposal into work being done at your proposed institution
General Essay Advice

• Closely read and follow the NSF prompts
• Proof-read
  – Also have someone else proof-read
  – Reviewers are looking for a reason to throw your application out; don’t give them one by being sloppy with your essay
• Be succinct and clear
• Stress intellectual merit and broader impact
  – Possibly make it easier for reviewers to find by bolding sections entitled “Intellectual Merit” and “Broader Impacts”
• Read as many successful past applicants’ essays as possible and use these as models for your own
• You want a cohesive application: make sure your past experiences, letters of recommendation, personal statement, and research statement all tie together
Additional Advice

• Don’t wait until the last minute
• Carefully read over the NSF GRFP website, guidelines, application, etc.
• Seek advice from professors
• Think of it as a competition: make the most of what little control you have in the application process (specifically, letters of recommendation and essays)
• Take it seriously: even if you aren’t super concerned about being awarded the fellowship, a lot of this material will be reusable in your graduate school applications
• Don’t be upset if you don’t get it: sometimes it comes down to luck
Additional Resources

• The NSF GRFP website:
  – http://www.nsfgrfp.org/
• Alex Lang (includes winning essays):
  – http://www.alexhunterlang.com/nsf-fellowship
• Philip Guo:
  – http://www.pgbovine.net/fellowship-tips.htm
• Jean Fan:
• Jennifer Wang:
  – http://www.jenniferwang.org/nsf.html
• Applying to Ph.D. Programs in Computer Science
Questions?

- Feel free to email me at: zach.a.daniels@gmail.com