Life After Grad School

Using Your Physics Degree at Internet & Tech Companies: Data Science and Predictive Modeling

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Outline

• Introduction

• Physics Grad School  2003-2010

• Transitioning to industry  2009-2010

• Studying and Interviewing

• Insurance R&D  2010-2012

• Decision Science  2012-present

• Conclusion
Physics at U of M

• 2003-2010
• Studied under 4 advisors (not necessarily recommended!)
  • Econophysics / Condensed Matter Theory
  • Condensed Matter Experiment
  • Back to condensed matter theory
  • Experimental High Energy Particle Physics at Fermilab
• Learned about social networks – turned out pretty useful
• Found interesting problems along the way
  • Optimal binning of data
  • Evaluating goodness-of-fit for models
Physics at Fermilab

- 2006-2010
- Enjoyed working with people from different countries
- Learned several new computer languages and analysis techniques
- Loved Chicago!

5.3 fb⁻¹ of data (p27)
Why did I leave academia?

• Fermilab was shutting down... I’d have to move to Europe to continue
• Highly competitive – only a handful of my cohort in HEP have academic positions
• Didn’t want to apply for grants
• Wanted to study more human-based data – I didn’t have intuition for top quarks like I might for car accidents or internet purchases
• My interests changed – computer science, predictive modeling, statistics
• Why leave physics altogether? HEP has no direct industries to my knowledge
• Shorter work hours (potentially)
• Higher pay
What did I fear?

• Would the problems be boring?
• Would my freedoms be restricted? (work hours, dress code, tools, etc.)
• Would I have access to good tools/computing resources?
• Would I get along with my managers and coworkers?
• Were there opportunities for advancement?
• Long hours?
• Too much or too little travel?
• Job stability?
• Would I succeed, or fail?
• Would I hate my job?
Netflix Prize and Statistical Learning

- 2009-2010 – decided that I wanted to investigate jobs
- Learned about the Netflix Prize
- Started hearing about the terms “predictive modeling” and “statistical learning” – read a lot of Wikipedia
- Did a LOT of Amazon surfing and found the best books in the field, read as much as I could
- Note: my friends who transitioned from physics to finance did similar self-study of finance books
Interviewing with Google

• 2010 interviewed with Google
• Use connections on LinkedIn to land interview
• Their team gave me a book list to study
• Be prepared to do live coding! (they used Google Docs to watch me code solutions to their interview questions)
• I passed a few initial rounds... but the interviews are very difficult, especially for object-oriented programming
• Google has the luxury of being very selective, so knowing physics isn’t enough
Interviewing with Insurance Company

• 2010 interviewed with a national insurance company
• Again used connections on LinkedIn to land interview!
• Read some Microsoft interview questions and other puzzle books – really helped me feel confident and think like an interviewer
• Interviewers were impressed that I had been reading Elements of Statistical Learning – they had a reading group at the company for the same book!
• Most difficult interview questions were related to confounding variables and selection bias, but the interviewer didn’t want to use those terms and lead me, so I had to finally figure out what he was really asking.
• Be prepared for 6+ hours of interviews... this can be exhausting and stressful, which is part of the test
Insurance

- 2010-2012
- Decent first job out of grad school
  - 4x increase in pay!
  - Didn’t need any experience other than my grad research
  - Learned SAS on the job
  - Learned a lot about corporate life, management styles
- Unfortunately...
  - Technology and analysis methodology were not up to FNAL/physics standards
  - I didn’t care for SAS – an archaic, clumsy language
  - Was not allowed to use many open source solutions (however, I did learn R)
  - Had several issues with management – they did not value creativity and were threatened by PhDs
• More good points:
  • Learned new ways to THINK, namely, organizing my time, energy, and goals to align with business needs
  • Started finding new intellectual problems
    • How does one bin data correctly/optimally?
    • How does one treat missing values?
    • How does a company implement a model effectively? Can some parameters of a model be static? Should they?
  • Found new tools, increased my skillset
    • SQL
    • R
    • SAS
Insurance

• More bad points:

  • Company was VERY hierarchical, managed in a top-down way – it was difficult to be noticed, heard, or to make a difference

  • Projects were highly managed, and implementation of an idea could take years

  • Our research division was poorly managed, and it became more-and-more obvious that things weren’t healthy – after a year, I began actively looking for a position away from insurance

  • In the space of +/- 3 weeks of my notice to leave, 5 other people similarly left

  • Eventually the group was re-organized and people were laid off
What did I fear?

- Would the problems be boring? **YES**
- Would my freedoms be restricted? (work hours, dress code, tools, etc.) **no**
- Would I have access to good tools/computing resources? **no**
- Would I get along with my managers and coworkers? **some**
- Were there opportunities for advancement? **maybe**
- Long hours? **no, but I hated being there**
- Too much or too little travel? **fine**
- Job stability? **evidently not**
- Would I succeed, or fail? **was on track to fail**
- Would I hate my job? **YES**

**Time to leave!!**
Interviewing… again…

• During my job search, I knew I wanted to leave insurance, but where should I go? Did a lot of self-searching.
• Did some personality tests / career tests
• Used LinkedIn, Dice, Monster, PhDJobs.com, etc.
• Reviewed my earlier books
• Began studying additional skills – SQL, R, finance
• Had phone interviews with a ton of companies – think of it like dating
• Interviewed with several companies
  • Sears
  • demographic data companies in Chicago
  • Amazon
  • Dotomi
ValueClick / Dotomi

- Flat structure – little hierarchy, small team size
- Ideas implemented immediately – I can see the results of my work
- Freedom of schedule – little-to-no micromanaging
- Creativity valued!
- Not just large data, but truly BIG data!
- Excellent computing resources
- Young, talented co-workers, excitement, and a fun work environment
- Slight increase in pay – I didn’t need to sacrifice anything to move to this better job
http://chicagocreativespace.com/valueclick/
So what exactly does ValueClick do?

Internet ads, for products you use every day!
Ads with Style

Create a Cook's Kitchen

Living Alfresco

Light Show

Pour on the Charm

Wake-up Call

Rise to the Occasion

Inviting Interiors

Party Starters
One Watch, Different People

**MAN**
- Single
- 35-45
- New York City
- Over 150k
- ★ 8 transactions
- ★ $1350 spent in the last 6 months
- ★ Risk-taker
- ★ Flashy style
- ★ The finer things in life
- ★ Always in the market

**WOMAN**
- Married
- 35-45
- Chicago Suburbs
- Over 75k
- Children present age 6-10
- ★ 3 transactions
- ★ $600 spent in the last 6 months
- ★ Classic comfort
- ★ Value shopper
- ★ Gift-giver
- ★ Research online/buy offline

**MAN**
- Executive
- 55-65
- Over 250k
- Divorced, no children
- Watches abandoner
- ★ Qualified prospect
- ★ 3 site visits in last 45 days
- ★ Risk-averse
- ★ The finer things in life
- ★ Luxury style
- ★ Value shopper
One Watch, Different People

BRANČō
Without a Cause
Red Rebel
Rebel Series
EXPERIENCE IT NOW

BRANČō
Man-Time
A gift he will appreciate for years to come
Rebel Series
LEARN MORE

BRANČō
Time Tested & Quality Made
Rebel Series
EXPERIENCE IT NOW
CONSUMER JOURNEY ACROSS DEVICES

Breakfast Browsing

Lunch Time

Commute Home

Evening on the Sofa
Average of **174 million registrations**/day

Average of **1.53 million online conversions**/day

Average of **2.14 million offline conversions**/day

Average of **210 million impressions**/day

Average of **15 billion (with a B!) RTB requests**/day
BUILDING AN ADDRESSABLE AUDIENCE

Multidimensional profiles are the foundation for data-driven communication.

80MM+ MULTIDIMENSIONAL PROFILES

50MM+ Unique Site Visitors (13 months)

30MM+ Offline Buyer File

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• Some projects I’ve worked on so far:
  • Found correlations between local weather and client sales
  • Evaluated predictive power of new 3rd party internet data sources
  • Network analysis (Brian Ball’s summer project)
  • Matching, matching, matching!
What did I fear?

- Would the problems be boring? no, interesting!
- Would my freedoms be restricted? work hours, dress code, tools, etc.) yes
- Would I have access to good tools/computing resources? yes
- Would I get along with my managers and coworkers? yes
- Were there opportunities for advancement? maybe (flat organization)
- Long hours? yes, but I love being here
- Too much or too little travel? none
- Job stability? yes, but rapidly changing environment
- Would I succeed, or fail? succeeding
- Would I hate my job? No, I love it!

Good fit for me!
Advice

• Prepare!
  • You will be competing with talented people for every job
  • Read some books
  • Polish up your résumé
  • Practice interviewing – accept interviews even if you think you won’t accept the job – it’s good interview practice
• Be confident and take risks – why not apply to Google or Amazon?
• Be present online – social networks, job sites, etc.
• Network – most of my interviews came from knowing someone
• Be selective – I wish that I had interviewed longer before accepting my first job
Any questions?
Thank you for your time today!