Transitioning from Academia to Data Science in Industry: A Few Humble Insights

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Disclaimer: Opinions expressed are solely my own and do not express the views or opinions of my employer.
Questions from the group

- Can you describe your career trajectory?
  - When did you decide to go into industry?

- Insight Health Data Science Fellowship
  - How do you apply?
  - What was it like?
  - What did you get out of it?

- What is involved in a career in health data science?

- What skills from PhD/postdoc do you use?

- What new skill did you learn?
“Wheresoever you go, go with all your heart.”
Ph.D. in Neuroscience: Schools of Engineering and Psychology
Investigating the role of low frequency oscillations in attention in health and ADHD

Designed and ran EEG experiments
Developed new methods: blind source separation
Applied signal processing and machine learning

Demanuele et al., 2010, 2012

Institute of Sound and Vibration Research and Developmental Brain-Behaviour Laboratory
Career Trajectory: 1st Postdoc

**Postdoc in computational neuroscience and psychiatry**
Employed fMRI and multivariate pattern analysis to investigate cognitive deficits in schizophrenia

A spatial map of brain activation during a task -> 1000’s of features (voxels)

Measures changes associated with blood flow: Low temporal resolution -> few observations
Career Trajectory: 2nd Postdoc

Postdoc in psychiatric neuroimaging
Use multimodal neuroimaging to characterize sleep spindle abnormalities in schizophrenia as a novel target for improving cognition

Sleep EEG  Magnetoencephalography  Structural MRI

Pharmacology  Behavioral & Clinical outcomes  Temporal coordination of oscillations

Martinos Center for Biomedical Imaging, MGH, Harvard Medical School
Transitioning to Industry

Am I sure?
How do I identify the right career path?
What are my skills?
How do I apply for jobs?
And what job? How do I prepare for interviews?
Overview of My Training: 2015

**Data Analysis**
- Multivariate stats
- R, MATLAB, Python
- Signal processing
- Time frequency
- Multimodal data integration
- Machine learning
- Bootstraps

**Applications**
- ADHD
- Schizophrenia
- Sleep

**Interdisciplinary Teams**
- Supervising
- Lecturing

**Clinical Research**
- Experimental design
- Data collection
- EEG, MEG, structural & functional MRI
- Pharmacology
- Physiology
- Anatomy
- Genetics

**Engaging the Community**

**Communication Collaboration & Leadership**
- Publications, Grants, Talks
- Peer reviewer
- Outreach activities

**Outreach activities**
- MIT, Harvard, Broad Inst., Boston Univ., Finland

**Supervising Lecturing**

**Pharmacology**

**Signal processing**

**Overview of My Training: 2015**

- Christopher James
- Daniel Durstewitz
- Matti Hämäläinen
- Andreas Meyer-Lindenberg
- Dara Manoach
- Robert Stickgold
Data Science in Healthcare

“A data scientist is that unique blend of skills that can both unlock the insights of data and tell a fantastic story about it.” DJ Patil

White House appoints first chief data scientist

Industry veteran D J Patil, who formerly worked at the Pentagon, will take up the new post

10 trends transforming healthcare in 2015

Hindsight is always 20/20.

Five years ago this January, the economy entered into a postrecession planning exercise: How to innovate in the face of changing economic, technical and political norms? The iPhone was a toddler, the iPad had just been unveiled and no one could have predicted the arrival of the Apple Watch let alone its Taptic Engine, a linear actuator inside Apple Watch that produces haptic feedback.

Fast-forward to 2015, and trends that emerged suggest a refined understanding of how data, technology and design will contribute to healthcare transformation.
INSIGHT HEALTH DATA FELLOWS PROGRAM

An intensive 7-week program for PhDs and MDs leading to a career in health data science.

APPLY NOW
READ THE WHITE PAPER

Want to be notified of future dates? CLICK HERE
High-impact teams

Smart individuals with the right skills

INSIGHT

7 Weeks

Full-time

$0
7-week Fellowship Program

INSIGHT IN A NUTSHELL

- **INTRO WEEK**
- **DATA PROJECT**
- **COMPANY VISITS**
- **JOB INTERVIEWS**

WEEK 1 | WEEKS 2-4 | WEEKS 5-7
INSIGHT FELLOWS PROGRAM APPLICATION

Insight offers six distinct fellowships in a number of different locations. Please select only one program, which best aligns with your career transition goals.

Select the location where you intend to live and work full-time after completion of the program. Select the start date that allows you to participate in the program full-time and accept a job offer immediately afterwards.

**DATA SCIENCE**
- Boston - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- New York - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Remote - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Seattle - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Silicon Valley - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Toronto - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018

**HEALTH DATA SCIENCE**
- Boston - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Silicon Valley - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018

**DATA ENGINEERING**
- Boston - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- New York - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Silicon Valley - Start Date: January 14th, 2019
  Early Applications due: August 20th, 2018

**DEVOPS**
- Silicon Valley - Start Date: January 14th, 2019
  Early Applications due: August 20th, 2018

**DATA PRODUCT MANAGEMENT**
- Silicon Valley - Start Date: September 4th, 2018
  Final Applications due: July 9th, 2018

**ARTIFICIAL INTELLIGENCE**
- Toronto - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- Silicon Valley - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018
- New York - Start Date: September 10th, 2018
  Final Applications due: July 9th, 2018

Questions about applying for the Insight Fellows Program? Check out our Application FAQ for:
- Artificial Intelligence | Data Engineering | Data Science | Health Data Science | Data Product Management

Not ready to apply? Sign up for our Notification List to get program updates.
Insight Health Data Science
Predicting Rehabilitation Effects for Constant Therapy Users
Improving Personalized Therapy For New Users

- Thousands of users (SQL database)
- 72 task types of varying difficulty levels
- Extracted 2,442 users representing the most popular task

Predict task performance for new patients

Patient characteristics

Behavioral data

Difficulty Level 2 (n=897)
Therapy Prospector

This app predicts the effects of therapy for new constant therapy patients, offering them more effective, targeted and personalized brain rehabilitation. It predicts the patient's end performance on a set task and difficulty level based on their demographic information and preliminary baseline activity. It compares their predicted end performance to the population of constant therapy patients.

See it work

<table>
<thead>
<tr>
<th>Input</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Auditory Command - Level 1</td>
</tr>
<tr>
<td>Baseline Accuracy:</td>
<td>0.5</td>
</tr>
<tr>
<td>Gender:</td>
<td>Male</td>
</tr>
<tr>
<td>Age</td>
<td>55</td>
</tr>
<tr>
<td>Disorder:</td>
<td>TBI</td>
</tr>
<tr>
<td>Deficit:</td>
<td>Reading</td>
</tr>
<tr>
<td>Condition Since:</td>
<td>6 months</td>
</tr>
</tbody>
</table>

Predicted end accuracy for this patient is 0.67. Patient is likely to perform better than 16.24% of the population on this task.
How can we leverage wearable and mobile technology to accelerate drug discovery and development, and transform clinical trials?

- Develop and validate digital solutions to improve clinical trials
  - Study design: device selection, protocol development, statistical analysis plan
  - Data analysis to develop new digital endpoints: statistics, data science, machine learning
What does health data science entail?

- Understanding the problem (domain knowledge, meeting with scientists etc)
- Understanding the audience/customers
- Coding: R, Python
- Statistical modeling
- Data visualization
- Signal processing
- Machine learning and AI
- Interpretation and presentation of results: be clear and succinct
- Learning on the job
- Specific to pharma: ability to search for data, and to deal with small and sparse datasets and/or coming from disparate sources not centrally stored
WHAT I WISH I KNEW IN 2016 ...
Postdocs are highly skilled

- How to educate yourself
- How to ask good questions
  - And design ways to answer them
- How to experiment
  - Again, and again and again ...
- How to develop a protocol
  - And when to ignore it
- How to make decisions using data
  - Generate data, analyze it, interpret it and present it

Ref: Seeding Labs
Before the transition

• Be positive and believe in your abilities
• Identify gabs in your knowledge
  • Look at requirements on data science job ads
  • Tons of online resources
  • Prepare for answering coding, statistics and data challenge questions on the white board
• Identify job hunting resources
  • Go to meet-ups and careers expos (e.g. Nature Jobs Career Expo)
  • Get involved in organizations such as Women in Bio and Healthcare Businesswomen Association
  • Leverage conferences and symposia
  • Use PubMed to identify labs, companies, foundations
  • Make a list of companies of interest and follow them
• Update your LinkedIn profile and your Resume
  • Seek help if you are unsure
  • Data science jobs may require links to GitHub accounts and mention of side projects you have done
  • My experience have been that hiring managers read cover letters
Before the transition

- **Think about what type of job is right for you**
  - Location
  - Compensation
  - Responsibility
  - Company size
  - Culture
  - Management style

- **Do not rush** to find a job
  - Think about what you’d like to do, what you are willing to learn
  - It helps if you can find some common ground between what you’d like to do and what is a hot topic

- **Do not compare** your journey to any one else’s: every transition from academia to industry is different

- **Do not try to match every single requirement listed in job ads** – focus on the top 4

- **Do not get disheartened** if companies take a long time to call you back
Interviewing

- Be positive and believe in your abilities
- **Know that interviewing for corporate jobs is a skill** and just like every other skill you need to invest time to master it
- Learn about the company, their business, their portfolio and their customers
- Prepare your elevator pitch (not more than a few sentences) and practice it with your family and friends
- Be ready to answer the questions: “why do you want to leave academia?” and “why are you excited about data science?”
- When they send the interview day agenda, research about the people you are meeting and prepare questions for them – it’s OK to ask the same question to different people
- When asked to solve **data challenges** on the white board, do this whilst keeping the conversation with your interviewer flowing
- When asked to give a talk:
  - Ask about your audience before your interview, and choose the highlights of your talk accordingly (this works best for larger companies)
  - Be respectful of their time: do not try to present your entire research during the job talk, but rather demonstrate that you can tell a coherent, succinct and interesting story
  - Present your work with enthusiasm – they need to know that you enjoy what you do, even if it is completely different to what they do
- Be the break in someone’s day
- Be enthusiastic and glad for any feedback you receive
After the Transition

- **Be positive and believe in your abilities**
- Demonstrate what you are great at, what you know, what you don’t know and what you are willing to invest time to learn
- Be prepared to learn every day: your job requirements will change, sometimes daily, and the pace is fast (but you can still be thorough)
- Be a thought leader irrespective of your job title
- Volunteer for tasks within and outside of your job description
- Surround yourself by hard working people
- Develop a good rapport with your seniors: mentoring is KEY especially outside academia
- Focus and be productive amidst the change around you
- Create your “perfect” job – sometimes your first few assignments are “tests”
- Be happy, helpful, genuine, honest and receptive to feedback
Priceless Advice

“You must tell yourself that you belong in this room, and in every room that you enter.”

... Pamela Puryear
“You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.”

Jane Goodall