Course Overview

PLEASE DON'T SKIP THIS LECTURE!

Data Science Career Guide

- Welcome to the course! Let’s discuss:
    - Course Curriculum
    - Where to get the Resources
    - How to get help during the course
    - Best Approach for the Course

Data Science Career Guide

- Course Curriculum
    - Non-technical Section
        - Data Science Careers
        - Positions and Titles
        - Knowledge Needed Overview
        - Resume Prep
        - Interview Process

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Data Science Career Guide

- Course Curriculum
  - Technical Interview Questions
    - Probability
    - Statistics
    - Product Design and Metrics
    - Machine Learning
    - Design of Experiments
    - Coding

Data Science Career Guide

- Feel free to jump around the sections!
- The course is designed to be modular so you can approach it however you want!

Data Science Career Guide

- The most important resource for you in this course is the guidebook!
- The guidebook is a resource link in this lecture, make sure you save the link!
- Let’s explore the guidebook.

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- How to get help during the course
    - Technical Issues
        - Video Buffering
        - Comment or Posting Issues
        - Platform Issues
    - Email **support@udemy.com**

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- How to get help during the course
    - Course Related Questions
        - Quick Google Search
        - Search the GuideBook
        - Search the QA Forums
        - Post to the QA Forums

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- Quick Note:
  - We can’t personally help with your current interviews.
  - Feel free to post questions you’ve been stuck on for other students to help collaborate on.

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- Other quick notes
  - You can change the playback speed
  - Also change video streaming quality
  - Use the Udemy App to download videos
  - All slides are linked to in guidebook

Data Science Career Guide

- Best Way to Approach the Course
- Treat it as a list of real example interview questions and solutions
- You will need to do extensive self-study to prepare for any data science interview.

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- The interview questions are real questions from Silicon Valley Tech Companies.
- Expect them to be extremely challenging!

THANK YOU FOR ENROLLING!

Data Science Career Guide

- Welcome to the course!
- Let’s go over the curriculum so you can decide what section you want to jump in at!

Data Science Career Guide

- Data Science Career Overview
- Data Science Interview Preparation
- Data Science Interview Process
- Interview Questions and Answers

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Data Science Career Guide

- Interview Questions and Answers
  - Probability Theory
  - Statistics
  - Product Analysis and Business Metrics
  - Working with Data with SQL
  - Coding Questions
  - Machine Learning
  - Design of Experiments

Data Science Career Guide

- What this course is not:
  - This course is not an overview that will teach your probability, coding, statistics, or machine learning.
  - We will only provide questions and solutions for those topics.

Let’s get started!

Why a Career in Data Science?

Data Science Career Guide

- Data Science is a field where you can create huge impacts by leveraging some fundamental ideas.
- Being able to extract key insights from data to help build a better future is one of the most fulfilling careers!

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- Often people only associate data science with large tech companies, but almost every industry can gain a substantial advantage with data science!
- There are also many positions that relate to the ideas in this field!

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- According to Forbes, jobs requiring machine learning skills are paying an average of $114,000.
- Advertised data scientist jobs pay an average of $105,000 and advertised data engineering jobs pay an average of $117,000.

Data Science Career Guide

- Annual demand for the fast-growing new roles of data scientist, data developers, and data engineers will reach nearly 700,000 openings by 2020.

Data Science Career Guide

- By 2020, the number of jobs for all US data professionals will increase by 364,000 openings to 2,720,000 according to IBM.

Data Science Career Guide

- Top Reasons for Data Science Career
  - Fulfilling work
  - Very interesting technical topics
  - High Demand
  - Great pay and benefits
  - It’s just simply awesome!

Data Science is Interdisciplinary

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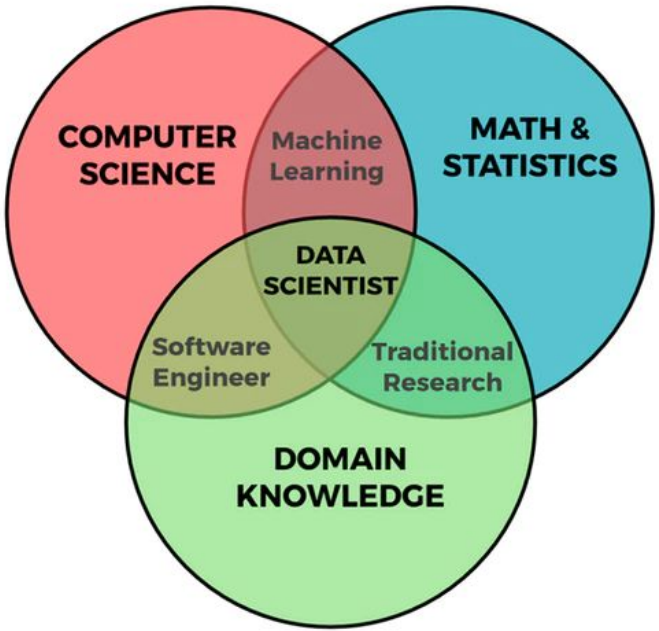
- There are many skills you will need



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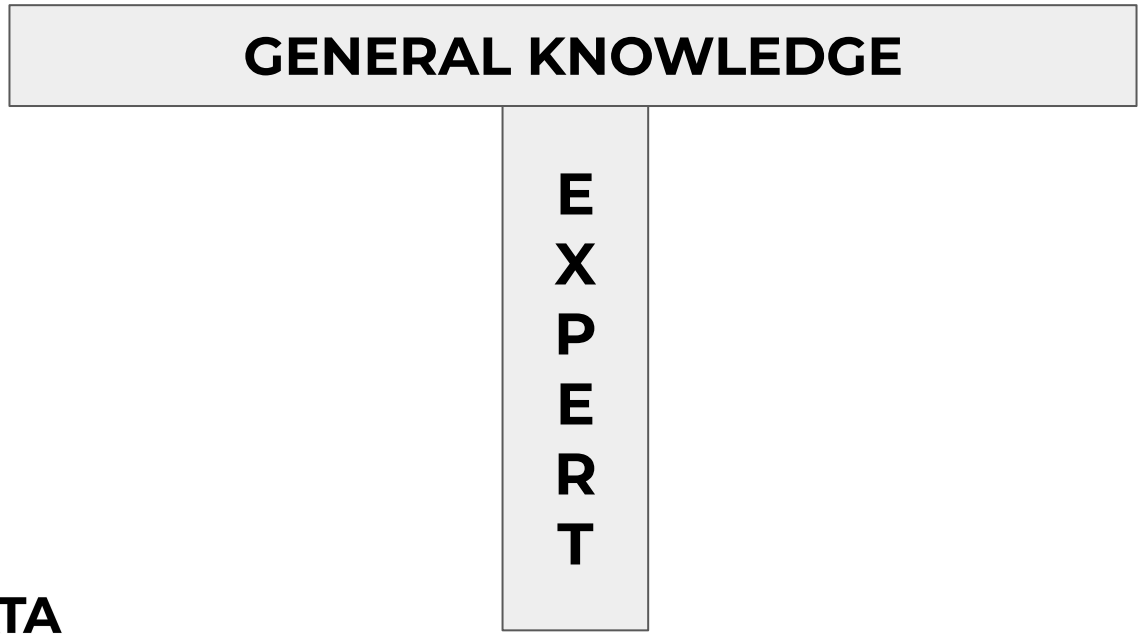
- T-Shaped Candidates



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- T-Shaped Candidates
- Candidates who have a general understanding of lots of topics and a deep expertise in one or few topics are known as T-Shaped candidates

Data Science Career Guide

- Let’s discuss the following
  - Tools of the Trade
  - Theory Knowledge
  - Machine Learning Knowledge
  - Software Engineering Knowledge

Positions and Titles

Data Science Career Guide

- The term “Data Scientist” is not the only job title that companies use.
- Many companies use different titles for different focuses for roles in the field of data science.

Data Science Career Guide

- Companies also use the same term differently, a “Data Scientist” at a small company may be called a “Data Analyst” at another company.
- Let’s go over a few titles and their general descriptions

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- Product Analyst / Product Data Scientist
  - Analyzes user data to create reports for product managers
  - Typically using coding as main tool, but companies may prefer pre-defined software tool

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- Business Analyst / Business Intelligence
  - Creating insights and analysis from business data
  - Often focuses on a specific tool such as Tableau or Excel

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- Machine Learning Engineer
  - Very technical role, both theoretical knowledge and good coding skills are necessary
  - Creates custom machine learning algorithm models for team

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- Data Engineer
  - Technical role focused on coding and tools, not so much theory.
  - Builds pipelines connecting data warehouse to data analysis or machine learning systems.

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- Data Scientist
  - Requires a mix of coding and theory skills.
  - Often company will post a more detailed use case on the actual job posting.

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- Overall, for many of these positions, focus less on the actual title and focus more on the qualifying skills of the job posting.
- Use sites like Glassdoor to find out more information about company job titles

Thoughts on Higher Education

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- A common question is do I need a Masters or a PhD to pursue Data Science?
- A lot of what is to follow are personal opinions, you will need to take the time to reflect on your specific situation.

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- Harder to get a job in a position with formal requirements like “Machine Learning Engineer” without an advanced degree in a larger company.
- Often recruiters will be given requirements for candidates.

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- If you plan to go more of an entrepreneurial route (e.g. freelancing) graduate degrees become less important.

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- Keep in mind each individual situation is different.
- Many entrepreneurs come from graduate degree backgrounds, and some employees at large companies don’t have graduate degrees.

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- Let’s take a look at two extremes on the spectrum of level of higher education.
- Keep in mind, most people will be somewhere in between these two.

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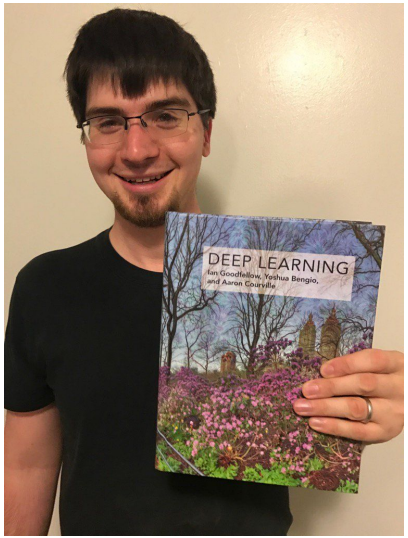
- Ian Goodfellow
- B.S. and M.S. in C.S. from Stanford University
- Ph.D. in Machine Learning from Université de Montréal
- Creators of G.A.N.



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- Adam Gibson
- College Dropout
- Creator of DeepLearning4j
- Cofounder of Y-Combinator backed company: Skymind

Data Science Career Guide

- Make sure you understand that the topics involved with Data Science are complex and are not easy to learn.
- There are no wrong or right paths to becoming a data scientist, create your own path on your career journey!

Preparing for Interviews

Introduction to Interview Preparation

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- This section will give high level overviews of what you should expect to know when embarking on a career in data science.
- Let’s go over the general topics we will discuss.

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- Technical Tools (Software Languages)
- Theory Knowledge
- Machine Learning Knowledge
- Software Tools

Let’s get started!

Tools of the Trade

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- Let’s discuss a few technical tools people use in the Data Science Industry
    - Programming Languages
    - Frameworks
    - Higher Level Software Tools

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- Programming Languages
  - Java
  - SQL (many similar types)
  - Python
  - R
  - Python and R are the most popular for data scientists.

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- Frameworks and Libraries
  - SciKit-Learn (Python)
  - Caret (R)
  - MLlib (Spark)
  - Lots of other libraries (e.g. pandas, numpy, various R libraries, etc...)

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- Software Tools
  - Weka
  - H2O
  - AWS ML Services
  - Turi
  - Tableau

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- Strategy for Tools
  - Pick one language and learn it well
  - Then expand to different languages
  - Look up what tools are used in your preferred companies (job listing description)

Example Job Posting

Qualifications:

- 3+ years of experience in business analytics or data science at a fast-paced company; consumer facing internet or EdTech business preferred
- Experience with experiment design and analyzing A/B tests
- Solid statistical foundation, comfortable with common statistical analysis techniques; familiarity with machine learning techniques is a plus
- Skilled at extracting, manipulating, and analyzing large data sets using SQL and a statistical language such as R or Python
- Familiar with advanced visualization tools
- Structured thinking and the ability to decompose ambiguous questions into discrete data problems
- Self-starter mentality, a strong sense of ownership, and an insatiable appetite for learning
- Team-oriented mindset and the ability to work with a wide range of individuals
- Passion for online education and consumer internet products

Theory Knowledge

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- General knowledge of the core concepts about data science and mathematics are even more important than the software tools used.
- Let’s cover some of the key concepts you should know when applying

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- Let’s begin by discussing some of the more basic math topics you should understand.
- Keep in mind few people are in expert in all of these, and you will constantly be learning more on the job as well!

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- Calculus
- Linear Algebra
- Probability Theory
- Statistics
  - Statistical Inference
  - Distributions and Descriptive Statistics

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- Specific Math Topics
  - Graph and Network Analysis
  - Bayesian Statistics
  - A|B Testing
- Check out the resource links for great online resources for these topics!

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- Reminder, few people are an expert in all of these!
- Just have a general understanding, enough so you can know where to look when you need to dive into these topics deeper!

Machine Learning Knowledge

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- Most Data Science roles will require you to understand various aspects of machine learning.
- Certain roles like “Machine Learning Engineer” will really focus on these concepts during the interview.

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- Supervised Learning
  - Linear Regression, SVM, Random Forest, Logistic Regression , KNN, etc...
- Unsupervised Learning
  - K-Means Clustering, PCA, etc...
- NLP, Model Validation, K-Folds, etc...

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- You should also have an understanding of basic concepts
  - Bias-Variance Trade-Off
  - Gradient Descent
  - L1 / L2 Regularization
  - Bagging / Boosting

Software Engineering Knowledge

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- Coding and programming will be a major part of your day to day activities as a data scientist!
- Let’s discuss what you may encounter during an interview.

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- Algorithms and Data Structures
- Databases (SQL)
- Distributed Computed (Spark)
- Data Visualization Products or Services
- Interview focus on this knowledge depends a lot on the company and position

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- Now we understand the various fields of knowledge you'll need to be familiar with as you venture on to your data science career!

Knowing when you are ready

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- Let’s discuss how you can know when you are ready to begin applying for positions in data science.
- There are a few key skills that you should have down before beginning your application process.

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- Here are the critical skills you need:
  - Working Knowledge of Programming
  - Knowledge of Probability and Statistics
  - General knowledge of Machine Learning
- Depending on the position, you may not need as deep a knowledge in certain areas

Data Science Career Guide

- A great way to tell if you are ready for typical data science positions is by practicing the questions in this course!
- Up next we'll describe the data science interview process, afterwards it's all practice questions and solutions!

Data Science Interview Process

Data Science Career Guide

- Resumes
- Interview Pipeline
- Strategies for Landing Interviews
- Negotiating Offers

Let’s get started!

Resumes

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- One of the very first things a potential employer will see is your resume.
- Let’s go over some key points when creating a resume for data science positions!

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- Use **metrics** to show what you've done
  - Increased accuracy by **30%** in fraud detection model
  - Managed a team of **3** to create revenue forecasting models

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- Customize resumes for positions and employers
  - Have resumes per position focus
  - Tailor resumes individually for your top companies

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- Social Proof
  - Up to date LinkedIn Profile
  - GitHub Page with recent projects
  - Kaggle Profile
  - StackExchange or Quora Profile
  - Personal Blog or Website

Data Science Career Guide

- General Resume Tips
  - One Page
  - Simple Formatting
  - Only use acronyms that are common (SQL is good, OPTICS might be bad)
  - Use only common file types (PDF, Word)

Data Science Career Guide

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Data Science Career Guide

- Let’s explore a resume example
- Check out the resource links for the direct link to these examples.

Interview Process

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- Let’s go through what you can expect during the interview process!
- Keep in mind, many companies will have their own unique approach or differences from this generalization.

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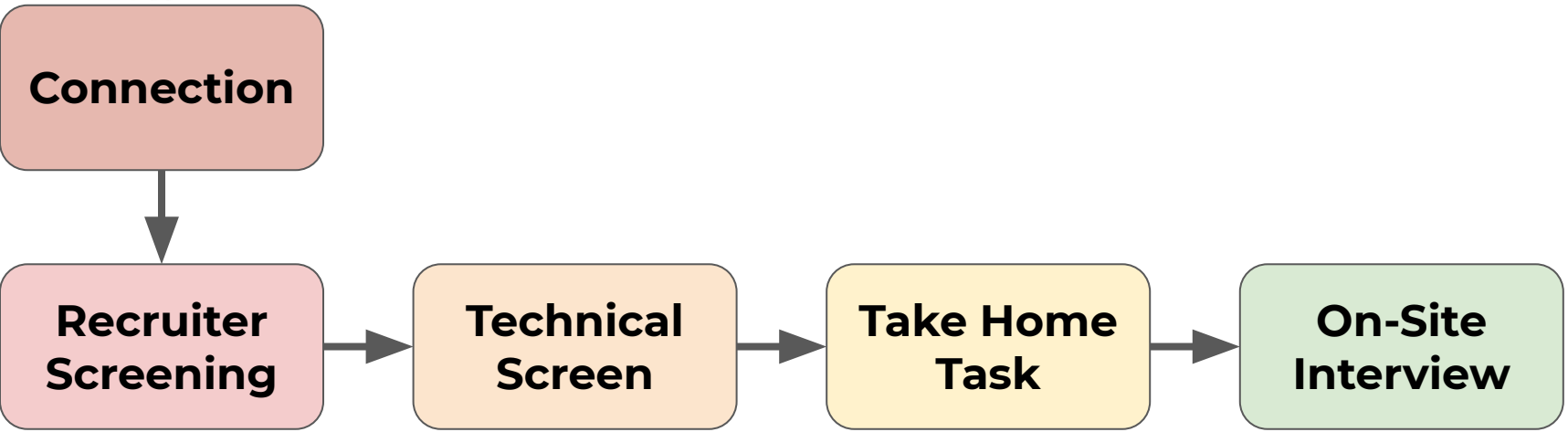

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- Each of these steps has multiple parts, let’s discuss them in a little more detail.

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- Connection
  - Occurs sometime after you apply
  - We'll discuss the application process in more detail later on.

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- Recruiter Screening
  - Typically a phone call or a web video call.
  - Details about the company and position
  - Checks for a culture fit and experience

Data Science Career Guide

- Technical Screening
  - Often a phone call or a web video call.
  - Technical questions on various topics.
  - Gives you a chance to find out about the more technical aspects of the job
  - Sometimes this is automated!

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- Take Home Task
  - Not every company will have this step
  - Give a data set you need to either do a free-form analysis, or create a model to solve a particular task

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- On Site Interview
  - Most intensive part of the process
  - Some companies have multiple on sites, but that is less common
  - Talks with multiple team members, both technical and non-technical

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- We'll discuss specific parts of this general pipeline later on in the course!

Landing Interviews

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- While there is a well reported shortage of good data scientists in industry, there are also more applicants than ever for these jobs
- This means you will find yourself applying to many, many jobs!

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- Let’s go through what a interview funnel may look like for you.

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100-200 Job Applications

30-50 Phone Screens

25-40 Technical Screens

15-25 Take Home Tasks

5-10 On Sites

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- As we just saw, it will take many applications just to begin getting job offers.
- Do not get discouraged! Even great engineers and data scientists get rejected for no good reason.

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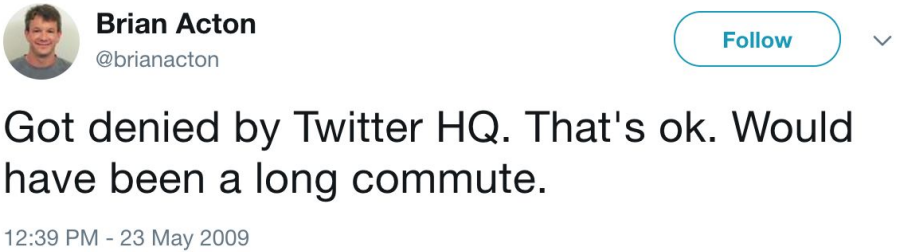

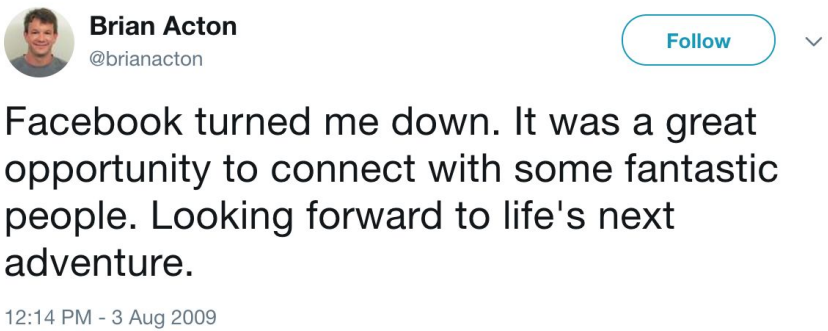

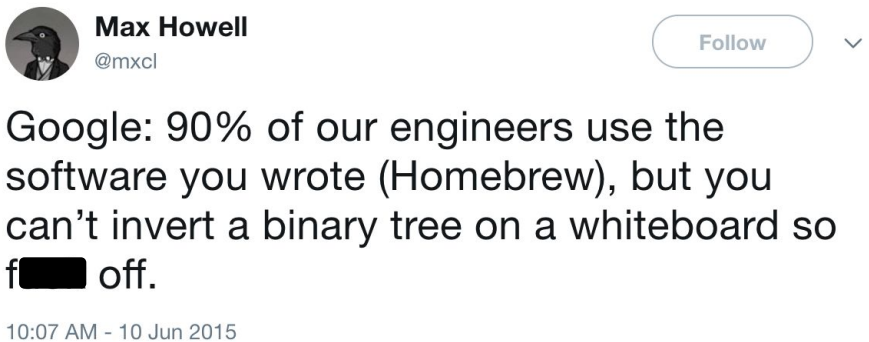

Data Science Career Guide

- Since you know that you'll need to apply to many positions, let's learn some good strategies for finding available positions, as well as the best way to initiate this contact.

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- Using your Network
  - By far the most effective approach!
  - Use your family, friends, contacts on LinkedIn to check for available positions.

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- Expanding your Network
  - Personal projects or participating in competitions is a great way to expand your network.
  - Also check out MeetUps for more great opportunities!

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- Applying “Cold”
  - Applying through the web directly is usually the worst pass through rate.
  - Indeed
  - LinkedIn Jobs
  - StackOverflow Jobs
  - Monster

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- Interview Services
  - These companies are still generally new, so keep an eye out for changes!
  - TriplyByte
  - Interviewing.io
  - Indeed Prime

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- Remember that applications are one of the most arduous steps in the entire interview process!
- Don’t let this process frustrate you or hold you back, everyone goes through it!

Negotiating Offers

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- You've done all the hard work of interviewing, now you've gotten offers!
- In the ideal situation you will have a few competing offers, let's discuss how to handle this last, yet crucial, step of the job search process.

Data Science Career Guide

- Compensation
  - Salary
  - Bonuses
  - Equity Stock
  - Fringe Benefits (401k, Health Insurance, etc...)

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- Salary
  - Use tools like Glassdoor and http://h1bdata.info/
  - Salaries vary by geographical location
  - Keep in mind, salary is not the only aspect of compensation.

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- Stock Equity
- For startups and smaller companies, compensation may rely heavily on stock equity.
- Equity is very complex and varies drastically between companies.

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- Stock Equity
- Check out the resources in the lecture for detailed write-ups on equity.
- If you are considering stock as a major aspect of your compensation, seek the advice of a legal professional.

Data Science Career Guide

- Important Considerations
- Research has shown that job satisfaction is most directly connected to your manager, day to day activity, your growth potential, and your environment.

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- Negotiating Offers
- Most companies expect negotiation unless otherwise explicitly stated
- Most companies will go 10-15% higher than initial offer
- Salary is not the only negotiation chip!

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- What can you negotiate?
  - Salary
  - Stock
  - Vacation
  - Relocation Expenses
  - Performance Review Schedules
  - Try it! You won’t know unless you ask!

Data Science Career Guide

- Things to keep in mind
  - Be friendly with the interviewer.
  - It’s a conversation, not a debate!
  - Always reiterate your excitement and what you can bring to the company.