

FOR ENERGY EFFICIENT INNOVATIONS

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Using Programming in Industry



Internal Use Only



Who, what, and where

Who: Ted Braun
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FLINT CENTRAL
HIGH SCHOOL



What: Data Science (data geeks)



Where: ON Semiconductor



ON Semiconductor

ON Semiconductor Overview & Supply Chain Points

Overall Company Points:

- \$5.51 Billion in sales in 2019
- Who are some of our biggest customers?
 - Apple, Samsung, Continental, Audi, Ford, GM (most all car companies), LG Electronics...

Supply Chain Points:

- We ship over 70 billion semiconductors a year
- We have over 100 factories (over 20 internal, the remaining external) worldwide
- We ship products from ½ a penny to \$100 USD in value
- Every day we schedule over 20 thousand orders
- At any one time we are working with ~900 thousand active orders

How are we able schedule over 20 thousand orders a day, send manufacturing schedules out to over 100 factories every week, and ship over 75 billion semiconductors a year...?



Via pen, paper, and Excel?

**No. Through automation, and thus...
via programming and Data Science!**

What - Software Development, Data Science and STEM jobs

- US News in 2020 ranks Software Developer the #1 Best Job in 2020¹
- The same US New 2020 Best Jobs in 2020 report coming in at #6... .. Statistician¹
- According to the US Bureau of Labor Statistics (BLS), demand for software developers is projected to grow by 22% by 2029.² The average projected growth rate across all occupations is about 4%.
- Per the US Department of Education: *"If we want a nation where our future leaders, neighbors, and workers have the ability to understand and solve some of the complex challenges of today and tomorrow, and to meet the demands of the dynamic and evolving workforce, building students' skills, content knowledge, and fluency in STEM fields is essential."*³
- Almost half (47%) of IT leaders have accelerated digital transformation and adoption of emerging technologies, including artificial intelligence (AI), machine learning, blockchain and automation. At the same time, "small-scale" implementations of AI and machine learning have jumped up from 21% before the pandemic to 24% in August 2020⁴

どう見ても。。。 Software Development, Data Science, and STEM jobs are in demand!!!



(no matter how you look at it)

¹ <https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs>

² <https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm>

³ <https://www.ed.gov/stem>

⁴ <https://www.techrepublic.com/article/cybersecurity-skills-in-short-supply-as-covid-19-tests-resilience-of-businesses-and-employees/>

Programming languages in general



In our jobs we extensively make use of a programming language named ‘R’. R is often thought of as a language used for “Big Data”, and we use it, along with many other tools, programming, and scripting languages

A few general thoughts as you begin learning programming languages:

- **Java:** A great language to learn initially as it teaches the correct fundamentals of programming in the “correct” manner. Used extensively in industry.
- **SQL** (Structured Query Language): Language required to know to interact with databases. You must know this language.
- **Python:** Probably most popular programming language currently.
- **R:** Used as described above
- **C & C++:** developed in 1969 and 1979 respectively, at the core of many programs and operating systems. Hard core stuff.
- **C#:** Primarily used to build .NET applications. Often in Microsoft Windows applications.
- **Javascript, Julia, PHP, Perl, Ruby,** and the list goes on...

MODERN DATA SCIENTIST

Data Scientist, the sexiest job of 21st century requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants

DOMAIN KNOWLEDGE & SOFT SKILLS

- ☆ Passionate about the business
- ☆ Curious about data
- ☆ Influence without authority
- ☆ Hacker mindset
- ☆ Problem solver
- ☆ Strategic, proactive, creative, innovative and collaborative



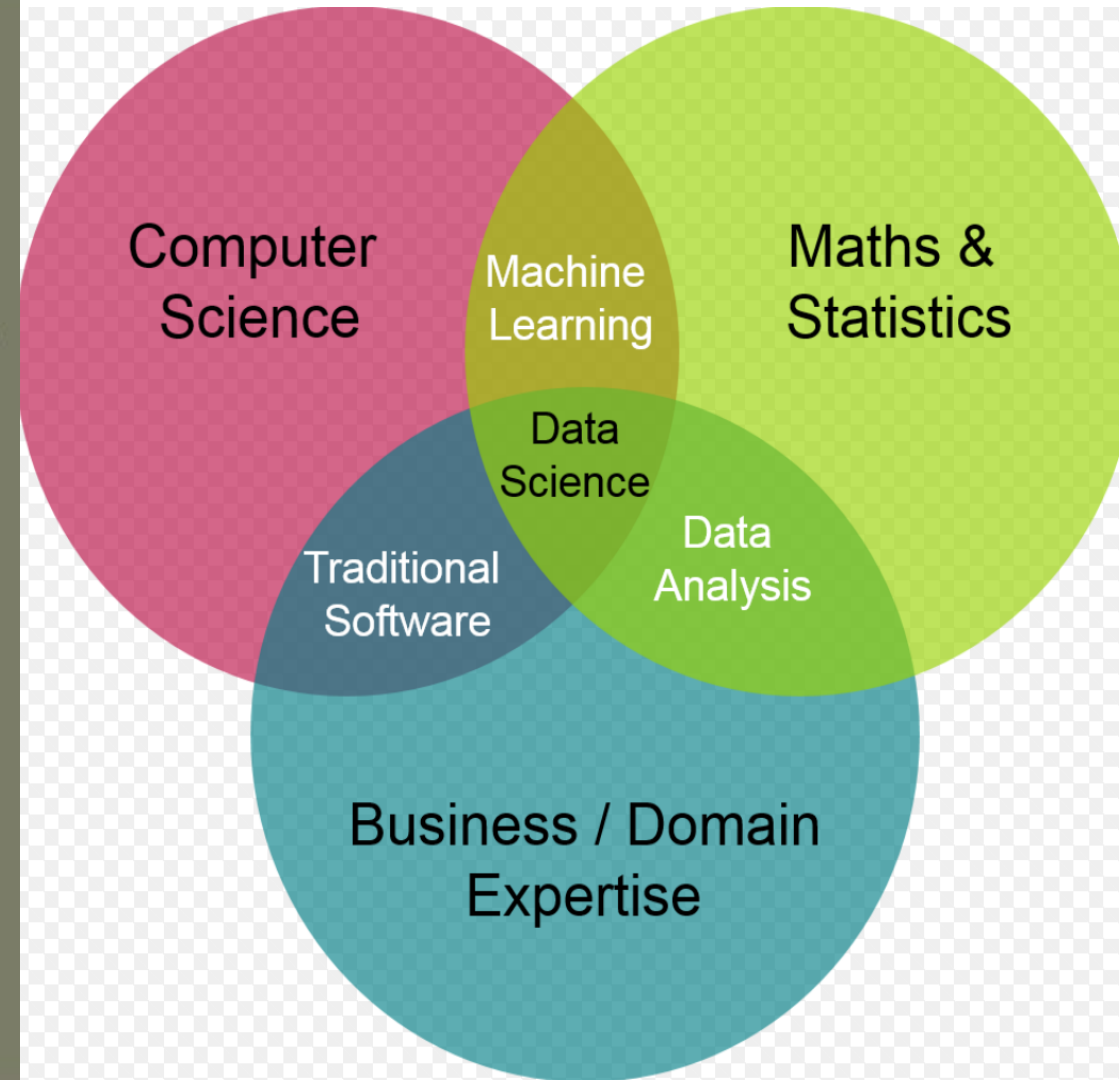
PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing package e.g. R
- ☆ Databases SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

COMMUNICATION & VISUALIZATION

- ☆ Able to engage with senior management
- ☆ Story telling skills
- ☆ Translate data-driven insights into decisions and actions
- ☆ Visual art design
- ☆ R packages like ggplot or lattice
- ☆ Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau

Who & What is a Data Scientist?



A few programming examples...

- SIR (**S**usceptible, **I**nfectious, or **R**ecovered) modeling simulation

Application & code for here: <https://mc-sir-model.glitch.me/>

- COVID fatalities over time

code for here: https://github.com/TedBYanKei/covid_counties/

- Phoenix historic temperatures over time - complex analysis isn't always better... 😊

code for here: https://github.com/TedBYanKei/Phoenix_Temps