

DATA SCIENCE

CLASS 1: INTRO TO DATA SCIENCE

0. WHO IS A DATA SCIENTIST?

I. HOW DATA SCIENTISTS ADD VALUE

II. THE DATA MINING WORKFLOW

III. QUALITIES OF A GOOD DATA SCIENTIST

INTRO TO DATA SCIENCE

0. WHO IS A DATA SCIENTIST?

**WHAT IS
YOUR
DEFINITION?**



Zvi

@nivertech



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"Data Scientist" is a Data Analyst who lives in California.

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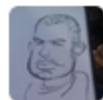
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9:55 PM - 14 Mar 2012



Josh Wills

@josh_wills



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Data Scientist (n.): Person who is better at statistics than any software engineer and better at software engineering than any statistician.

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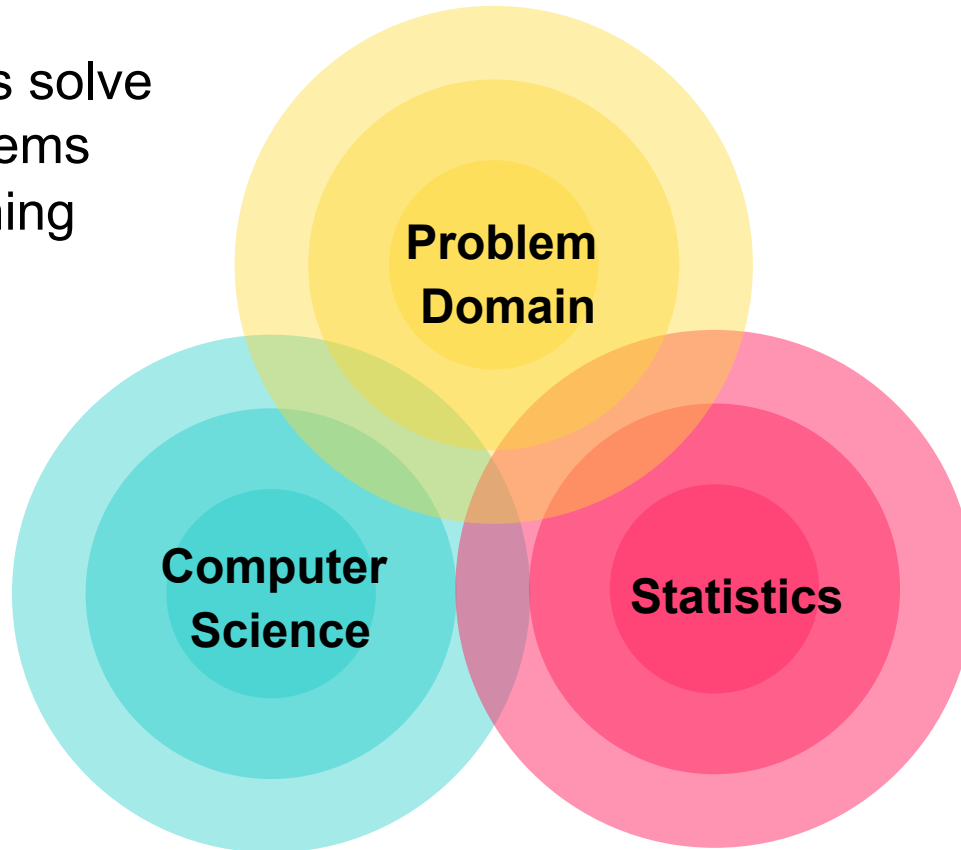


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WHO IS A DATA SCIENTIST?

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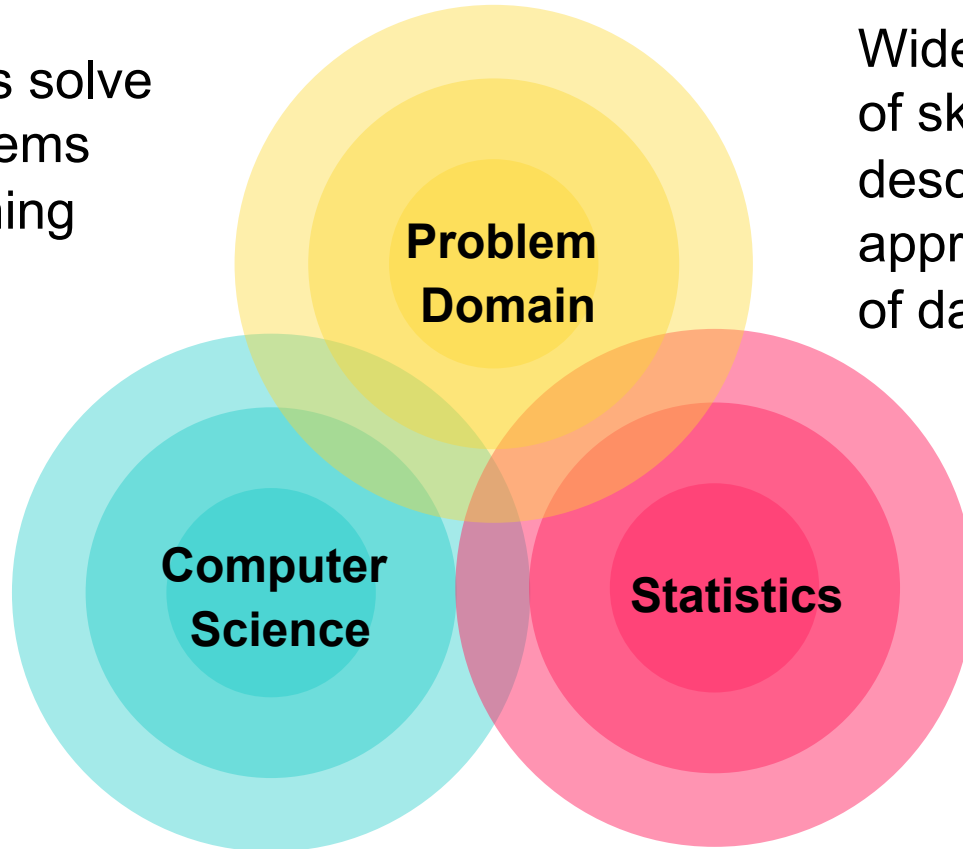
Data Scientists solve
complex problems
using data mining
techniques



WHO IS A DATA SCIENTIST?

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Data Scientists solve complex problems using data mining techniques



Wide variance in terms of skillsets: many job descriptions are more appropriate for a team of data scientists

INTRO TO DATA SCIENCE

I. HOW DATA SCIENTISTS ADD VALUE

5 Minutes:

Take 5 minutes, search the internet, and write down as many examples as you can of data scientists in action.

5 Minutes:

In a small group, introduce yourselves. As a group, decide how to best “cluster” your examples around how the data scientist adds value. You can have as many clusters as you want! Make sure you have a label for each cluster.

Data mining techniques generally add value by doing one of four things:

- 1) Predicting the bad
- 2) Identifying the good
- 3) Automating existing processes
- 4) Identifying patterns in data

Data scientists can be found within many fields: let's look at some additional examples to motivate this course.

Source: <https://www.youtube.com/watch?v=fPzmnRj67IY>

EXAMPLE #1: PREDICTING NEONATAL INFECTION

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Problem: Children born prematurely are at high risk of developing infections, many of which are not detected until after the baby is sick

Goal: Detect subtle patterns in the data that predicts infection before it occurs

Data: 16 vital signs such as heart rate, respiration rate, blood pressure, etc...

Impact: Model is able to predict the onset of infection 24 hours before the traditional symptoms of infection appear



Image: <http://www.babycaretips4u.com/wp-content/uploads/2014/03/premature-baby.jpg>

Case Study: <http://www.amazon.com/Big-Data-Revolution-Transform-Think/dp/0544002695>

EXAMPLE #2: AUTOMATING GOVERNMENT PAPER-PUSHING

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Problem: Processing disability claims at the Social Security Administration is a time-intensive process, with many claims taking over 2 years to adjudicate

Goal: Automate the approval of a subset of the “simplest” disability claims

Data: Free text in the claims form

Impact: Able to fully automate 20% of the simplest claims. Rating accuracy of the algorithm is higher than the average claims examiner.



II. THE DATA MINING WORKFLOW

- 0. Define the problem / question**
- I. Identify and collect data**
- II. Explore and prepare data**
- III. Build and evaluate model**
- IV. Communicate results**

0. DEFINE THE PROBLEM / QUESTION

Can I predict infection before it occurs?


Can I predict claim approval from the start of the process?

I. IDENTIFY AND COLLECT DATA

**Vital Areas:
Heart Rate,
Blood Pressure,
etc...**

**Want to collect
all data on the
claim form
(mostly free
text)**

II. EXPLORE AND PREPARE DATA



**Aggregate data
at the minute
level**



**Cluster like
words**

III. BUILD AND EVALUATE MODELS

**Compare
Decision Tree
with Logistic
Regression**

**Start with Naïve
Bayes Classifier**

IV. COMMUNICATE RESULTS



**Create custom
dashboard for
doctors and
nurses**



**Create report
and dashboard
proof of concept**

III. QUALITIES OF A GOOD DATA SCIENTIST

**ASKS
RATIONAL
QUESTIONS**

**RETAINS
INTELLECTUAL
HUMILITY**

**COMMUNICATES
CLEARLY**

**UNDERSTANDS
THE PROS & CONS
OF DIFFERENT TECHNIQUES**

**STATISTICIANS, LIKE
ARTISTS, HAVE THE BAD
HABIT OF FALLING IN LOVE
WITH THEIR MODELS
– GEORGE BOX**

