# Master in Data Science – Introduction

Israel Herraiz

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# Contents

# Why data science?

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**The data science process**

$$\text{Data} \rightarrow \text{Information} \rightarrow \text{Decision}$$

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**The goal**

Data-Driven Decision Making

# What is a data scientist?

## Key skills

- Fitting in an **organization**, leading projects in a heterogeneous environment, aligning with strategy
- Data-Analytic **Thinking**
- How to extract **knowledge** from data

## The three facets of a data scientist

- Functional (domain knowledge)
- Analytical (how to extract knowledge from data)
- Technical (how to implement the data science process)

# What is a data scientist?

## Key skills

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## The three facets of a data scientist

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## Question

- Are the three facets equally important?
- Which facet is the most important?

# Skills demanded in job postings

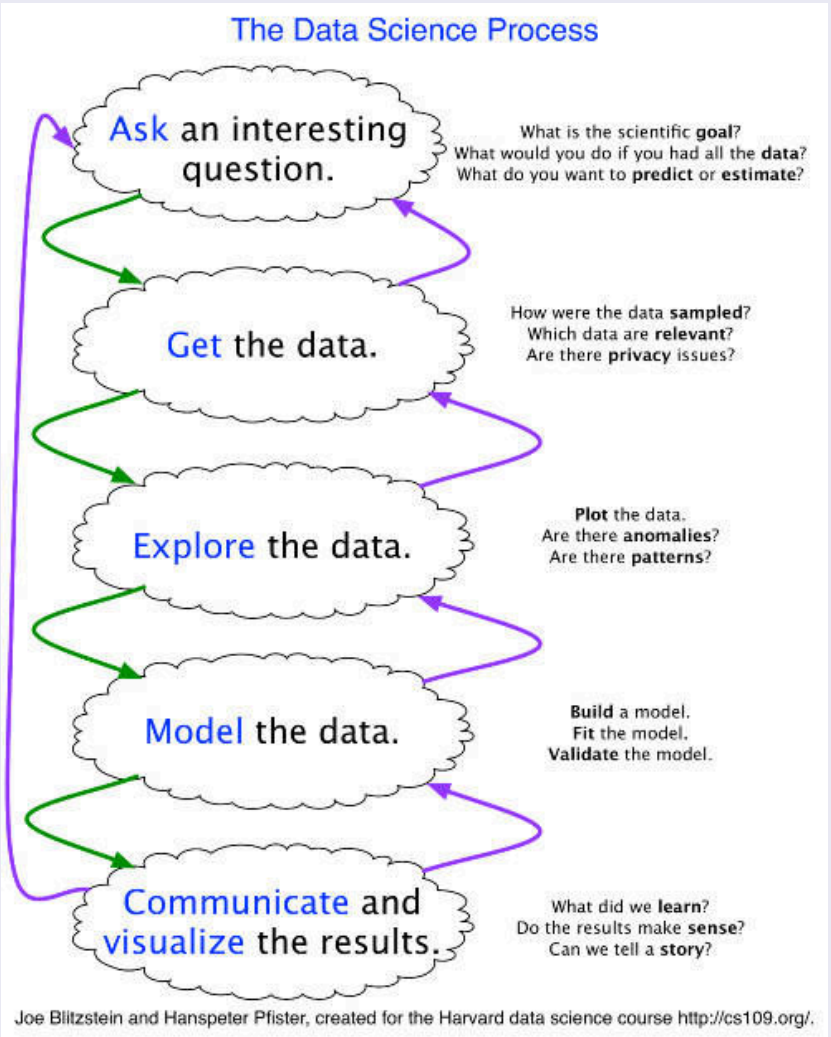
## Analytical skills

- Machine Learning
- Statistics
- Bias towards engineering and scientific backgrounds

## Technical skills

- R or SAS for statistical programming
- Python
- SQL
- Hadoop and Big Data (covered only partially)
- Visualization technologies (Tableau, Qlik, D3.js)
- Excel

# The Data Science process

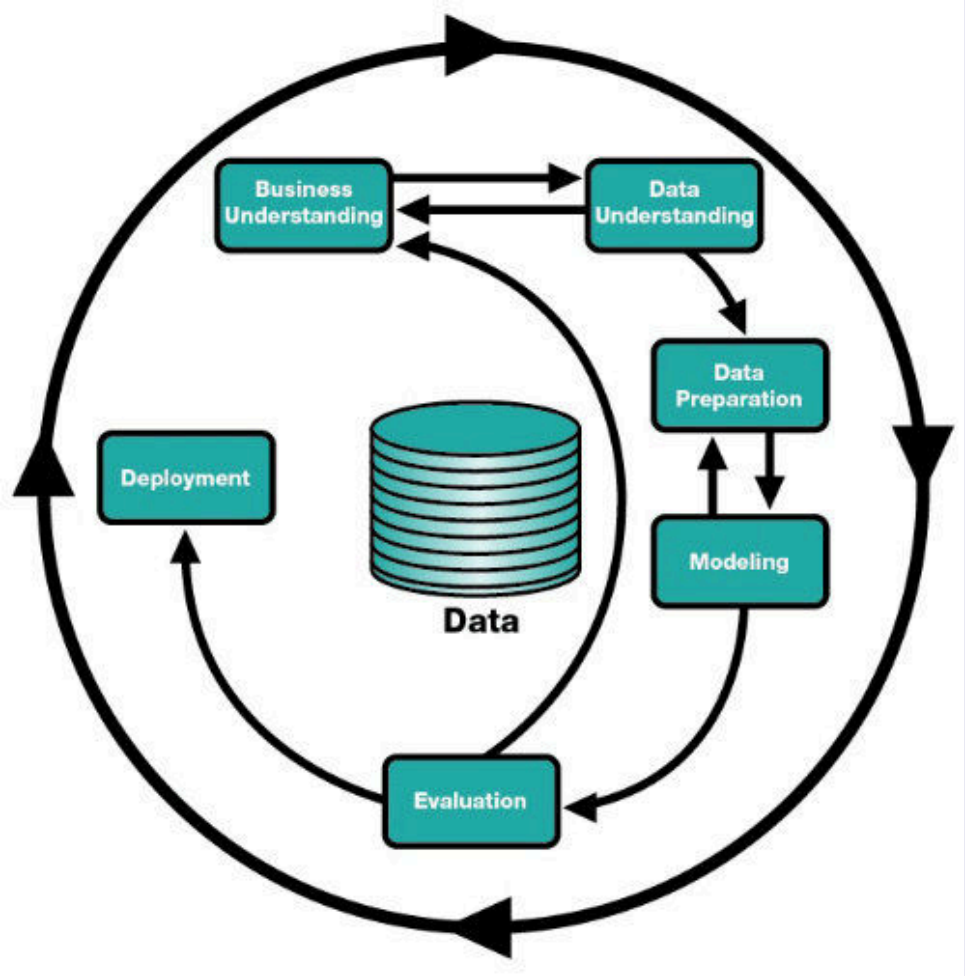



1. Ask a question
   - *Domain expertise*
2. Get and prepare the data
   - *Python*, *Pandas*
3. Explore the data
   - *Pandas*, *Matplotlib*, *R*, *Spark*, *Tableau*
4. Model the data
   - *R*, *Spark*
5. Communicate the results
   - *D3.js*, *Tableau*

http://www.kdnuggets.com/2016/03/data-science-process-rediscovered.html

# But it is always iterative...

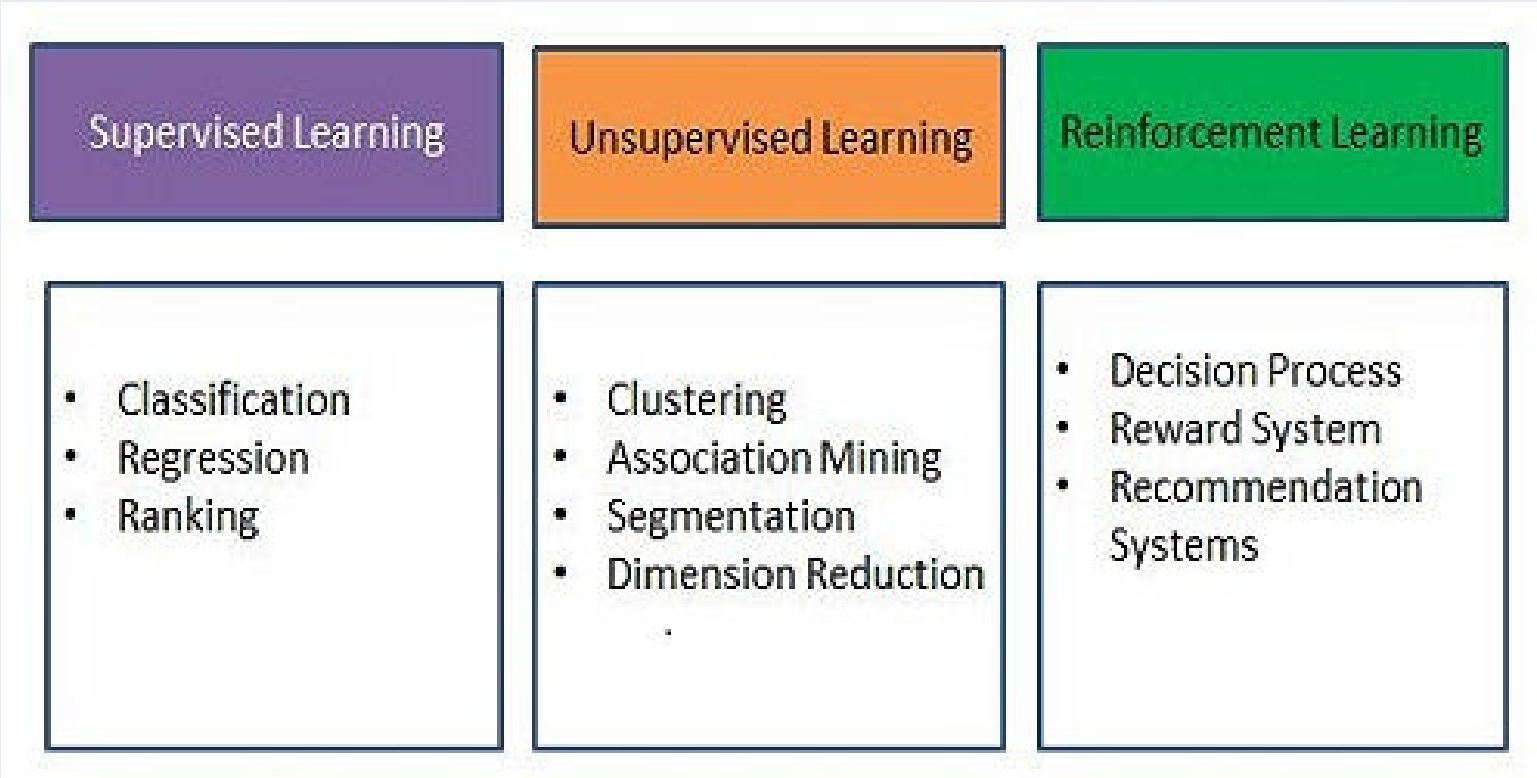
## Very rarely (never?) you will do it in just one pass




https://en.wikipedia.org/wiki/Cross_Industry_Standard_Process_for_Data_Mining

# What kind of questions can we answer to?

## Machine Learning & Statistics Applications




http://www.kdnuggets.com/2015/09/questions-data-science-can-answer.html

# What kind of questions can we answer to?

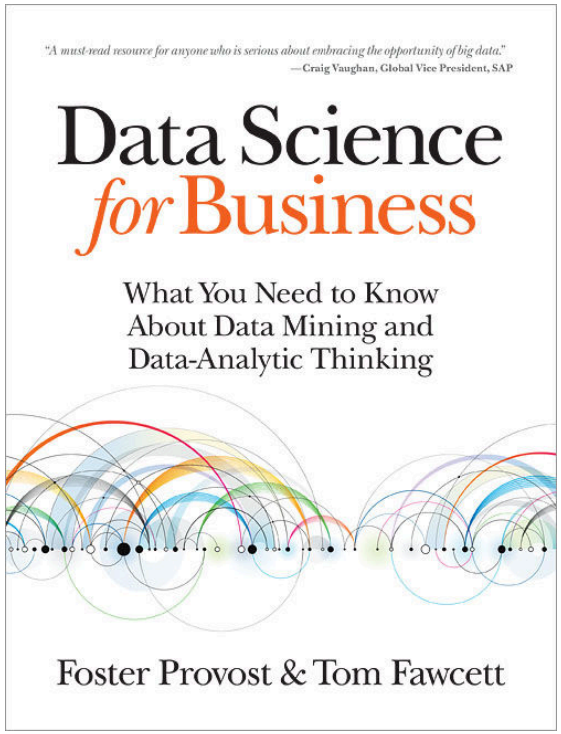
## Classifications of questions

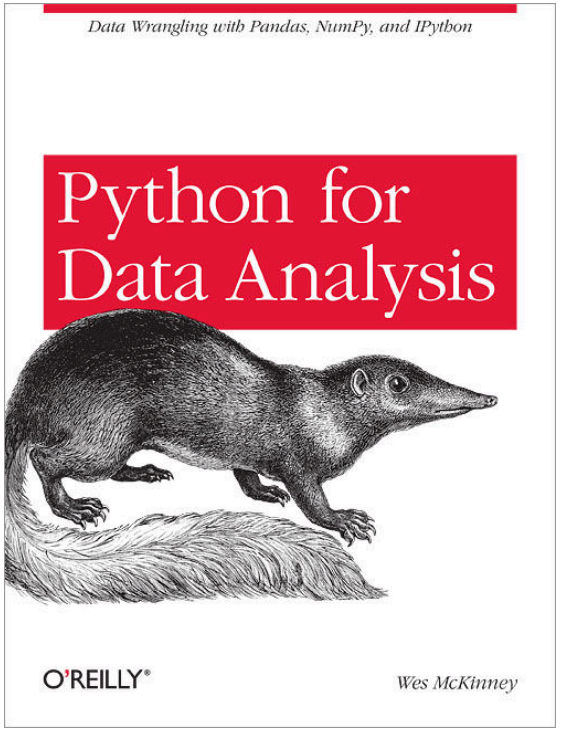
- Is this $A$ or $B$?
  - Binary classification
- Is this $A$, $B$, $C$ or $D$?
  - Multi-class classification
- Is this normal or weird?
  - Anomalies detection
- How much or how many?
  - Regression
- How is this data organized?
  - Unsupervised learning
  - Dimensionality reduction
- What should I do now?
  - Recommendation systems

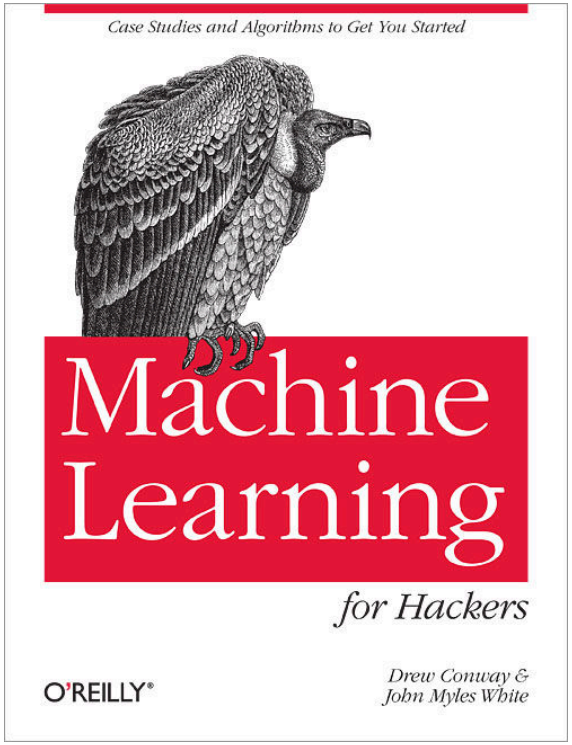
# The program

- **Intro to data science**
  - Setup environment, working with the command line, intro to Git
  - Intro to SQL
- **Data analysis**
  - Python for Data Analysis
  - Intro to Statistical Programming (R)
- **Machine Learning and Statistics** (R)
- **Big Data**
  - Very brief intro to Hadoop and Spark, using Python
- **Visualization and Business Intelligence**
  - Dashboards development with Tableau
  - Brief intro to D3.js

# Recommended books



# Share promiscuously

## You need visibility

- Use the social networks to position yourself as a data scientist
  - **Crucial:** Profile in **LinkedIn** and share, share, share!
  - Share frequently about your progress in the master
- Share your code in **Github** or Bitbucket
  - Try to use it frequently, so it always shows recent activity
  - Don't worry if you don't know Git, we will see in the first session
- Don't mix (too much) your personal postings with your data scientist postings
  - For instance, use Facebook for your personal network, and Twitter for your professional postings

# Recommended readings

## Amadeus Data Scientists series

http://www.amadeus.com/blog/tag/data-scientist/

## Guía de las profesiones de Internet

http://www.avanzaentucarrera.com/llegaraser/profesiones-y-p

# Take away

## Key ideas to remember during the master

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## Key ideas to remember during the master

- Extracting useful knowledge from data to solve business problems can be treated systematically by following a process with reasonably well-defined stages.
- From a large mass of data, information technology can be used to find informative descriptive attributes of entities of interest.
- If you look too hard at a set of data, you will find something – but it might not generalize beyond the data you are looking at.

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- Extracting useful knowledge from data to solve business problems can be treated systematically by following a process with reasonably well-defined stages.
- From a large mass of data, information technology can be used to find informative descriptive attributes of entities of interest.
- If you look too hard at a set of data, you will find something – but it might not generalize beyond the data you are looking at.
- Formulating data science solutions and evaluating the results involve thinking carefully about the context in which they will be used.

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- From a large mass of data, information technology can be used to find informative descriptive attributes of entities of interest.
- If you look too hard at a set of data, you will find something – but it might not generalize beyond the data you are looking at.
- Formulating data science solutions and evaluating the results involve thinking carefully about the context in which they will be used.
- It's not about the technologies. Technology will always change very fast. Learn the concepts, apply them with technology. Be open to learning new technologies (and sometimes it will also imply learning new concepts). The only constant is change.

# Program for this week

## Intro to data science

We have just completed this part.

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Intro to Git, and the importance of sharing our source code

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## Getting familiar with the command line

Many times the shell command line is enough to answer to a lot of questions