FIRST MEETUP

Welcome to

DiSCo

BGU's Data Science Community

MEET • TEAM UP • KAGGLE

HAVE FUN!

Sign Up Here: tinyurl.com/discobgu

DiSCo
Data Science Community

Bengis Center for Entrepreneurship & Innovation
Guilford Glazer Faculty of Business and Management
Ben-Gurion University of the Negev

BEN-GURION UNIVERSITY OF THE NEGEV

25 MARCH 2018

DOORS OPEN AT 18:30

- 18:30-19:00 - WELCOME AND INTRODUCTION. WHO ARE WE AND WHAT ARE THE COMMUNITY'S GOALS.
- 19:00-20:00 - LET THE FUN BEGIN! CREATING GROUPS AND INITIATING THE FIRST KAGGLE COMPETITION.

Learning data science through kaggle

Team DiSCo

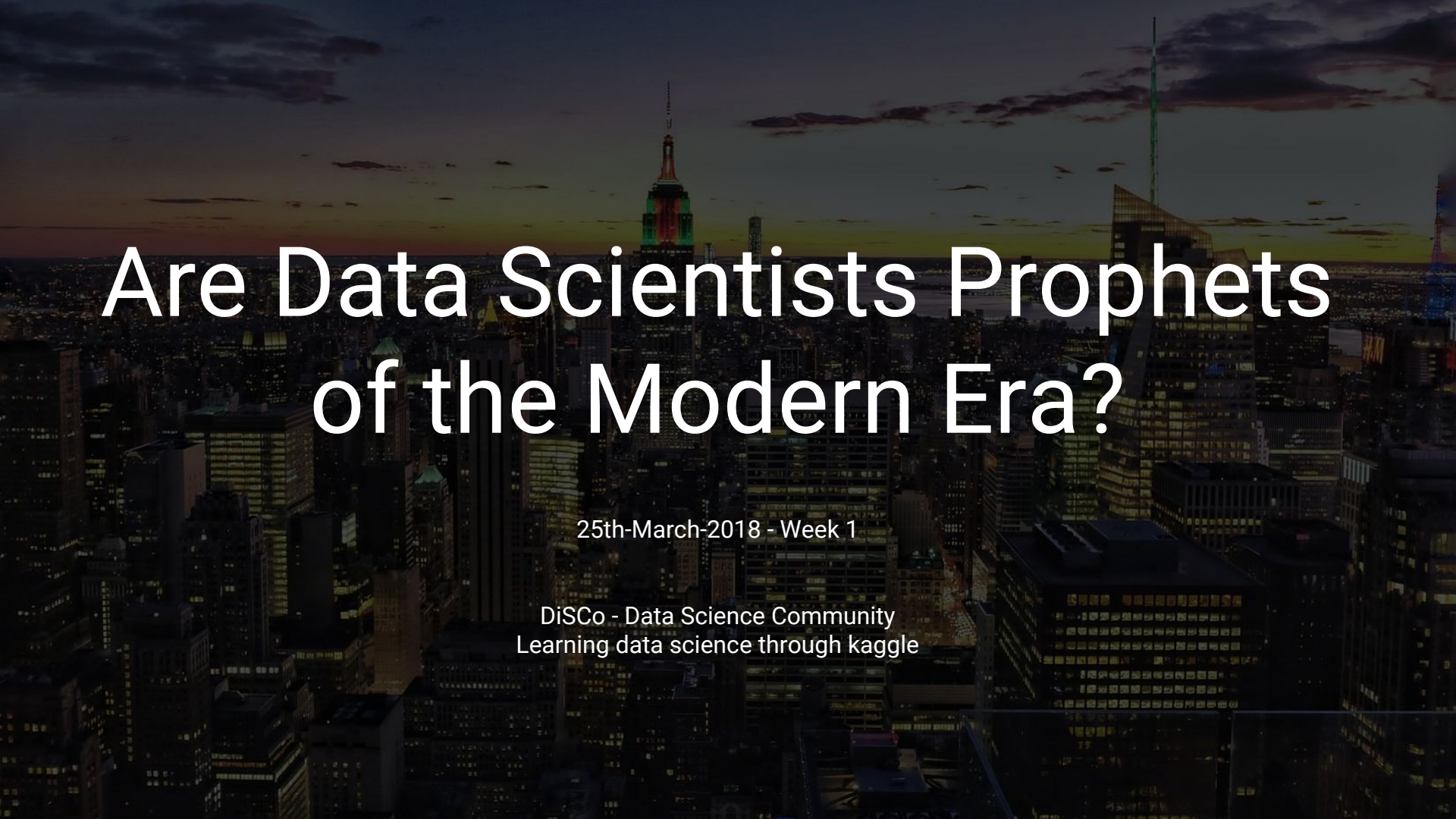
Rahul Veettil

Minesh Jethva

Ruth Hashkes

Moran Sharon

https://www.bengis.org/disco



Are Data Scientists Prophets of the Modern Era?

25th-March-2018 - Week 1

DiSCo - Data Science Community
Learning data science through kaggle

Predictions by Nostradamus

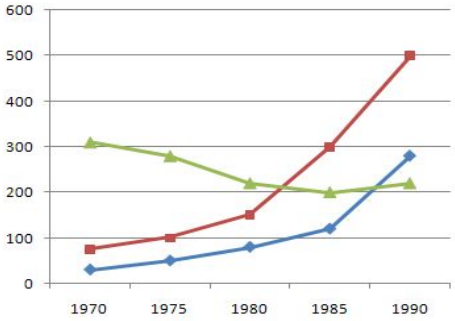
Death of the Kennedy Brothers

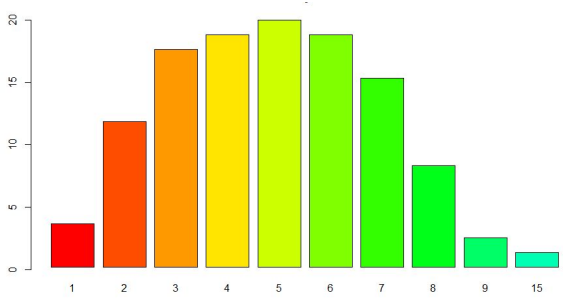
Reign of Hitler

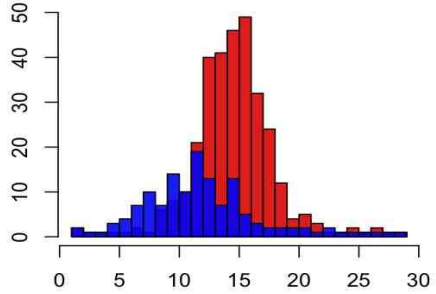
The French Revolution

9/11

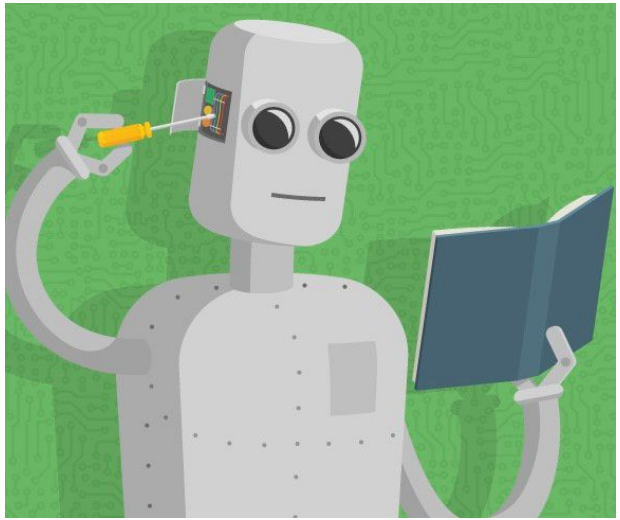
Agenda





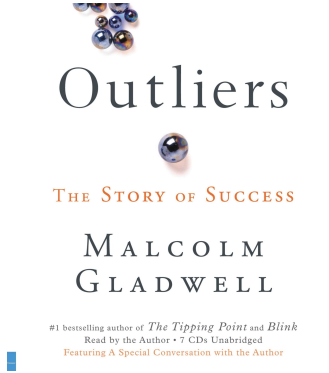


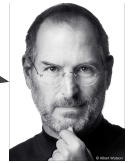
python

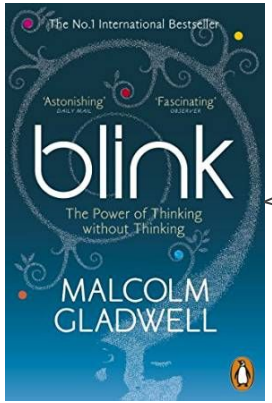


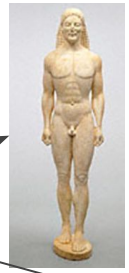
kaggle

The ‘science’ in Data Science





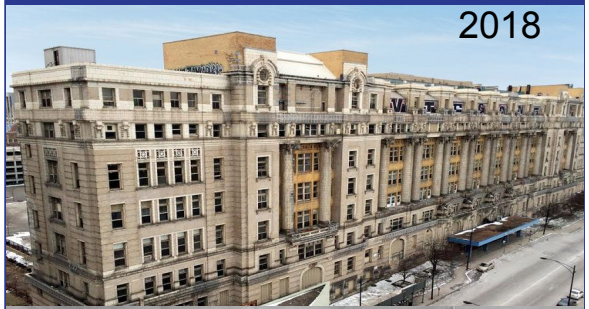




The intriguing story of Heart Attack Diagnosis

Algorithm was 70 percent better than the old method

Cook County Hospital



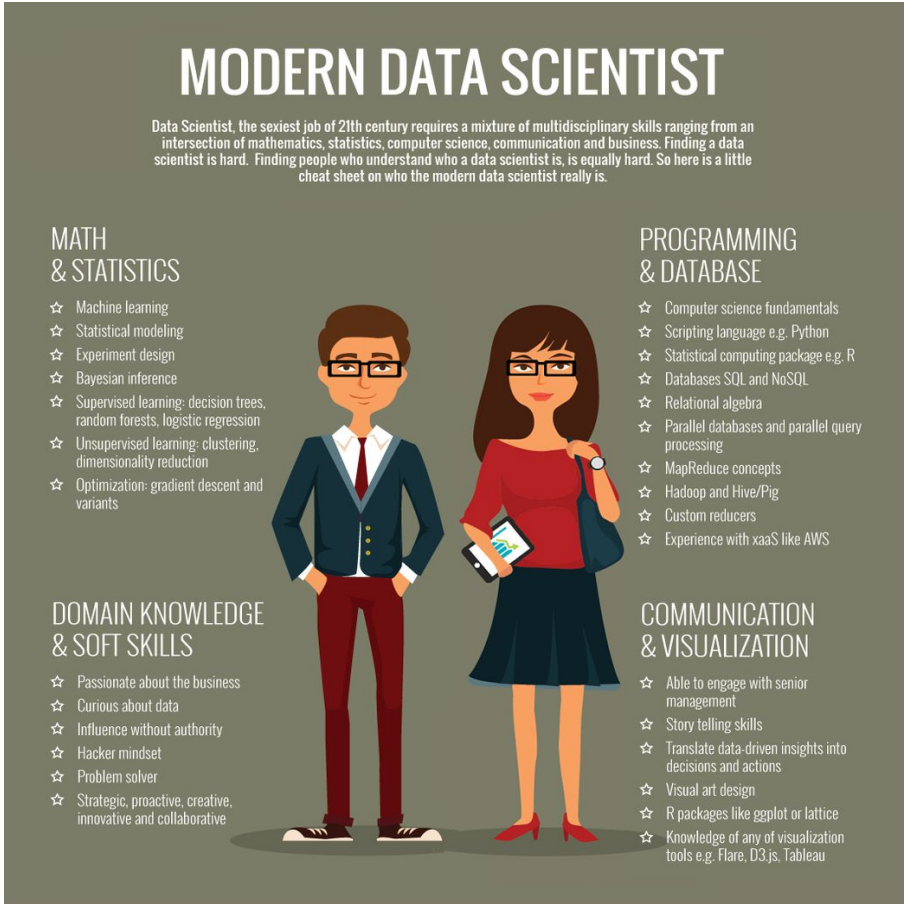
Problem Statement

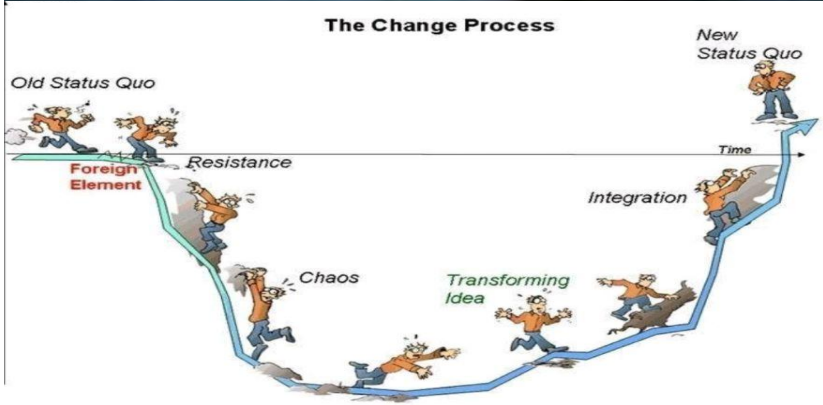
How to decide whether a person in the emergency room is having a heart attack and how serious it is

Solution

- Electrocardiogram reading
- Fluid in patient's lung
- Unstable angina

Developing a data scientist's mind set

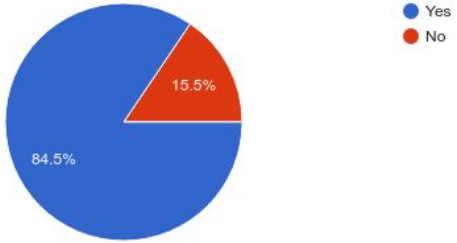




DiSCo - Google form submission data

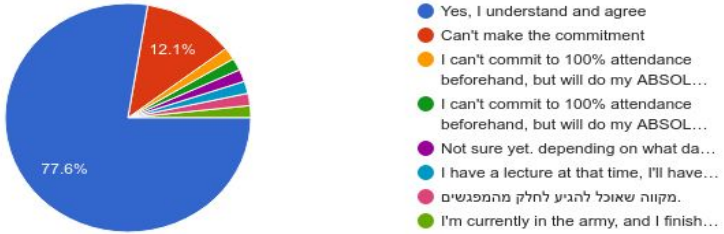
Are you a student?

58 responses



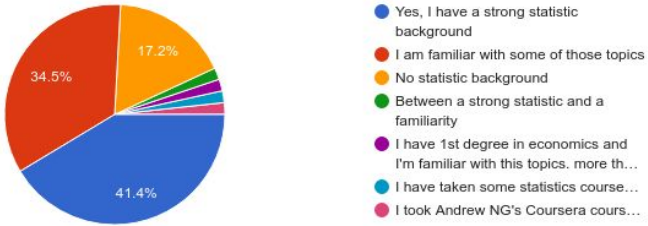
In order to create the community, we first limit the number of participants. Therefore, by signing in, you express ... community during the whole semester.

58 responses



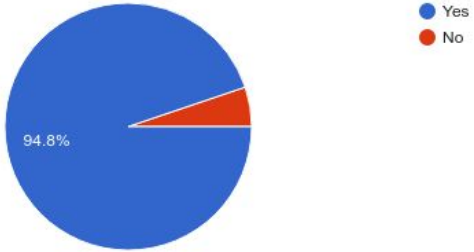
Have you taken any courses in statistics in the past (t-test, chi-square, ANOVA, Linear regression etc)?

58 responses

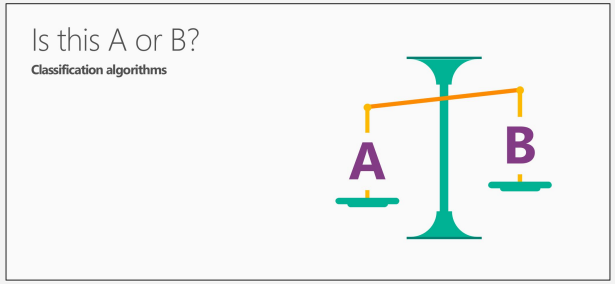


Do you know programming in any language (R, Python or any other)?

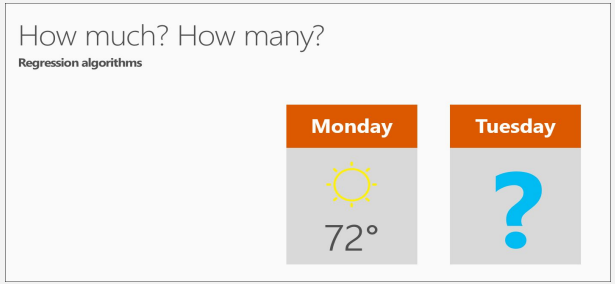
58 responses



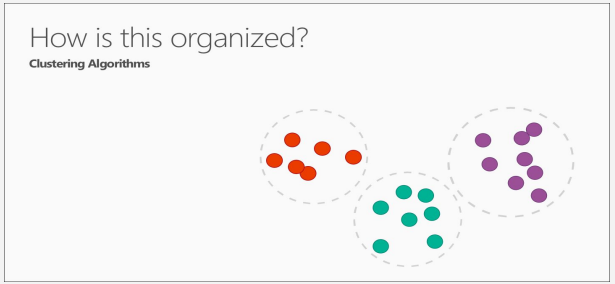
Introduction to Machine Learning Algorithms



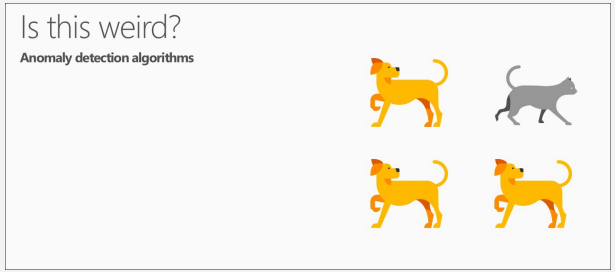
Classification



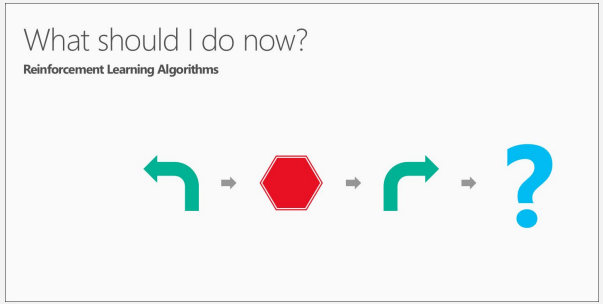
Regression



Clustering

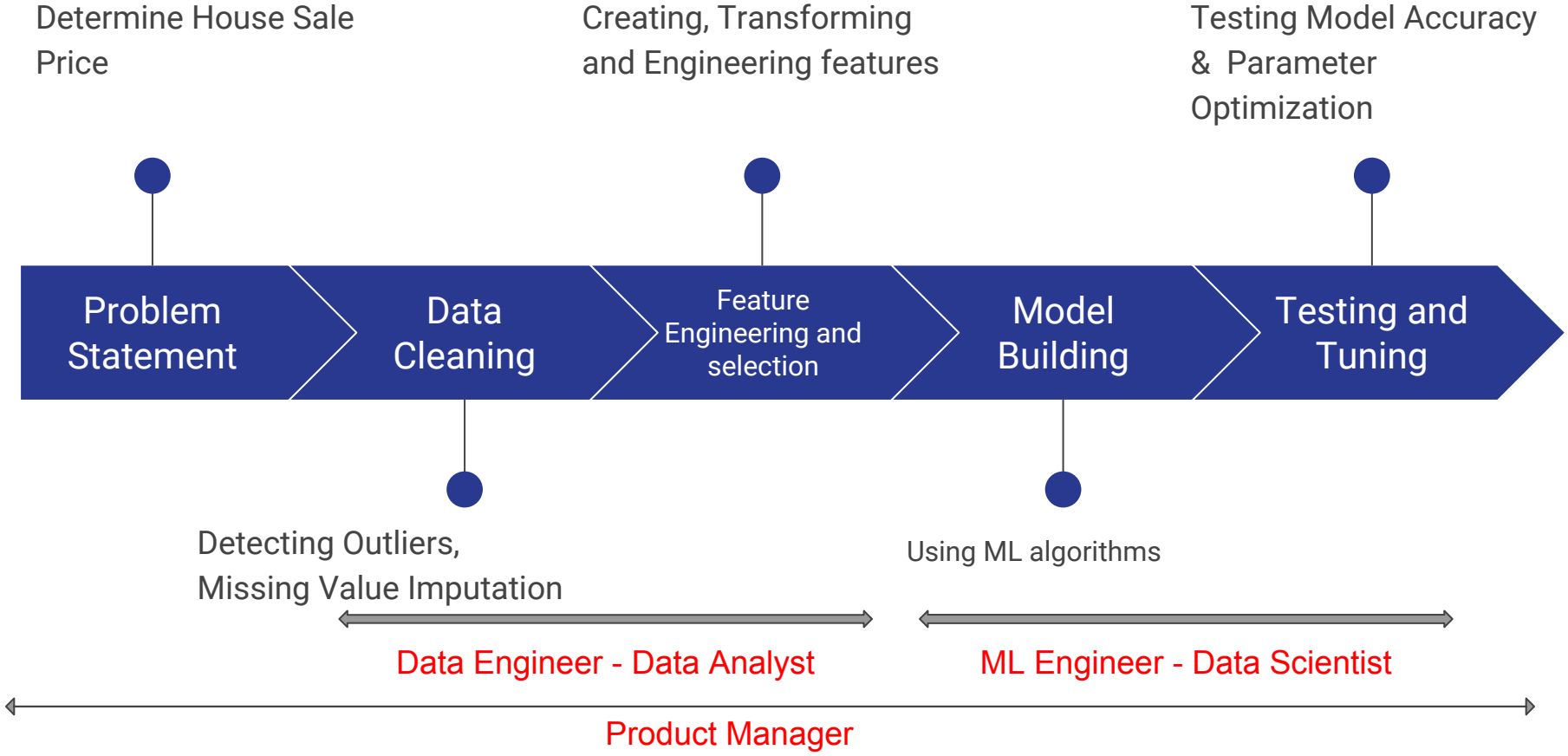


Anomaly detection



Reinforcement learning

Workflow


Determine House Sale Price
Creating, Transforming and Engineering features
Testing Model Accuracy & Parameter Optimization
Problem Statement
Data Cleaning
Feature Engineering and selection
Model Building
Testing and Tuning
Detecting Outliers, Missing Value Imputation
Using ML algorithms
Data Engineer - Data Analyst
ML Engineer - Data Scientist
Product Manager

Ok! Let’s get our hands dirty

https://tinyurl.com/disco-git
https://tinyurl.com/disco-kernel1
https://tinyurl.com/disco-facebook

kaggle Search kaggle Competitions Datasets Kernels Discussion Jobs

House Prices: Advanced Regression Techniques

Predict sales prices and practice feature engineering, RFs, and gradient boosting

4,375 teams · 2 years to go

Overview Data Kernels Discussion Leaderboard Rules Team My Submissions Submit Predictions

- Description
- Evaluation
- Frequently Asked Questions
- Tutorials

Start here if...

You have some experience with R or Python and machine learning basics. This is a perfect competition for data science students who have completed an online course in machine learning and are looking to expand their skill set before trying a featured competition.

Competition Description

Ask a home buyer to describe their dream house, and they probably won't begin with the height of the basement ceiling or the proximity to an east-west railroad. But this playground competition's dataset proves that much more influences price negotiations than the number of bedrooms or a white-picket fence.

With 79 explanatory variables describing (almost) every aspect of residential homes in Ames, Iowa, this competition challenges you to predict the final price of each home.

House Prices Competition

House Price - Let's start with an exercise

Square Feet	Sales Price
100	$ 100K
200	$ 200K
300	$ 300K
...	….
150	$?

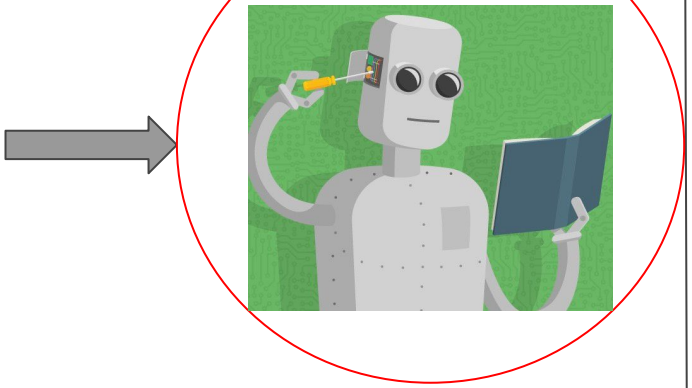
House Price - One more exercise :)

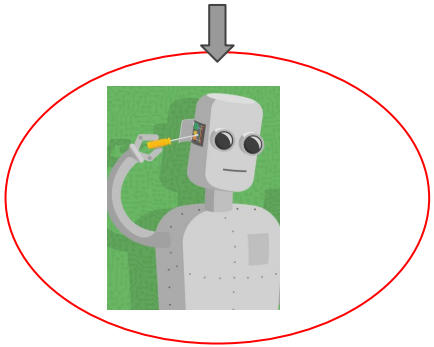
Square Feet	**Crime Rate** (no per 10k people)	**Sales Price**
100	10	$ 100K
200	40	$ 50K
300	20	$ 150K
...	...	….
400	30	$?

Real life scenario

Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	LandContour	Utilities
1	60	RL	65.0	8450	Pave	NaN	Reg	Lvl	AllPub
2	20	RL	80.0	9600	Pave	NaN	Reg	Lvl	AllPub
3	60	RL	68.0	11250	Pave	NaN	IR1	Lvl	AllPub
4	70	RL	60.0	9550	Pave	NaN	IR1	Lvl	AllPub
5	60	RL	84.0	14260	Pave	NaN	IR1	Lvl	AllPub

Problem Statement





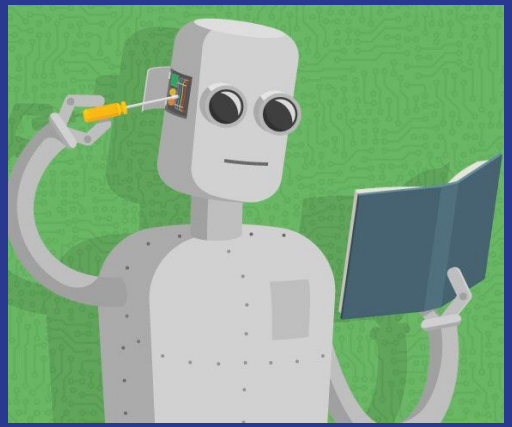
Features of individual houses

What factors can you think of right now which can influence house prices ?

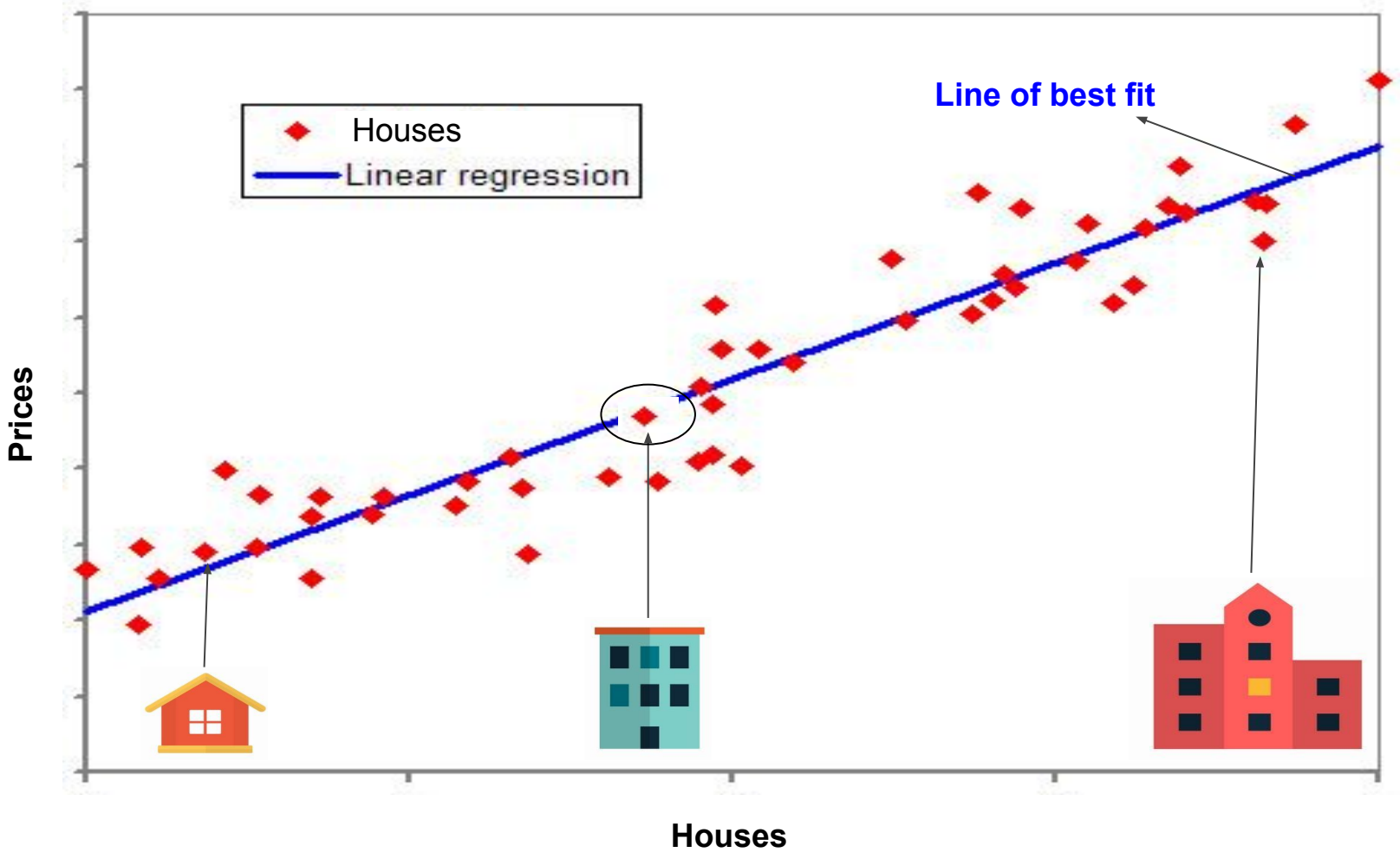
- Area of House
- How old is the house
- Location of the house
- If terrace is available
- If car parking is available
- If security is available

- Price

Simple Linear regression



Express-highway of best fit


Houses
Linear regression
Line of best fit
Prices
Houses

Linear regression : Introduction

In supervised learning, we have examples of lots of input and the desired output value.

This is called the **dataset**:

- A matrix of **feature vectors** X.
- A vector of **target values** Y.

- Area of House
- How old is the house
- Location of the house
- If terrace is available
- If car parking is available
- If security is available

- Price

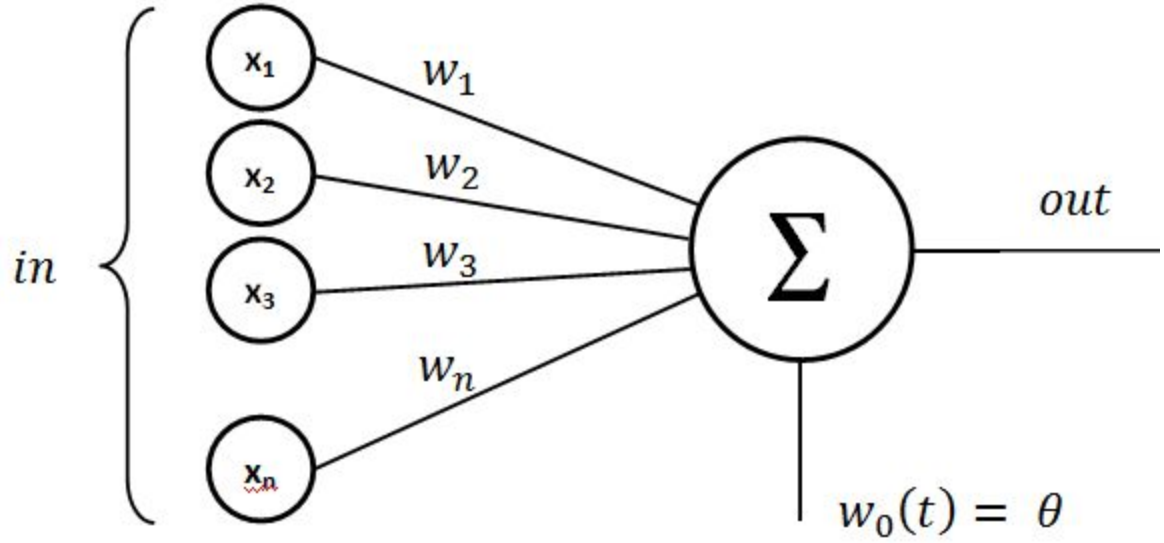
Data Exploration

Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	LandContour	Utilities
1	60	RL	65.0	8450	Pave	NaN	Reg	Lvl	AllPub
2	20	RL	80.0	9600	Pave	NaN	Reg	Lvl	AllPub
3	60	RL	68.0	11250	Pave	NaN	IR1	Lvl	AllPub
4	70	RL	60.0	9550	Pave	NaN	IR1	Lvl	AllPub
5	60	RL	84.0	14260	Pave	NaN	IR1	Lvl	AllPub

Statistical Analysis

1. **Univariate Analysis** - Examples: histogram, density plot, etc.
2. **Bivariate Analysis** - Examples: bar chart, line chart, area chart, etc.
3. **Multivariate Analysis** - Examples: stacked bar chart, dodged bar chart, etc.

Linear model

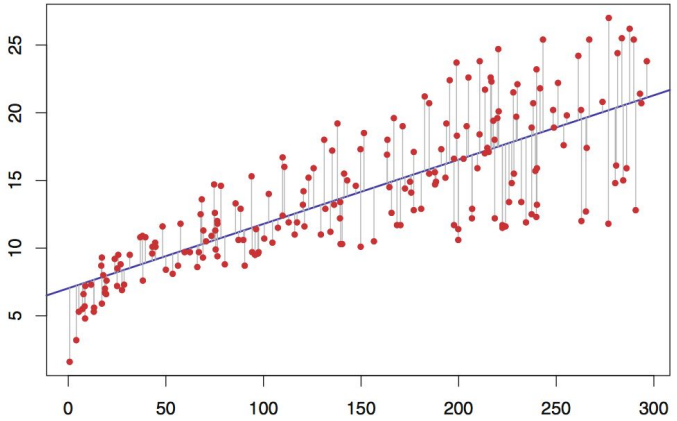


Linear regression : error function

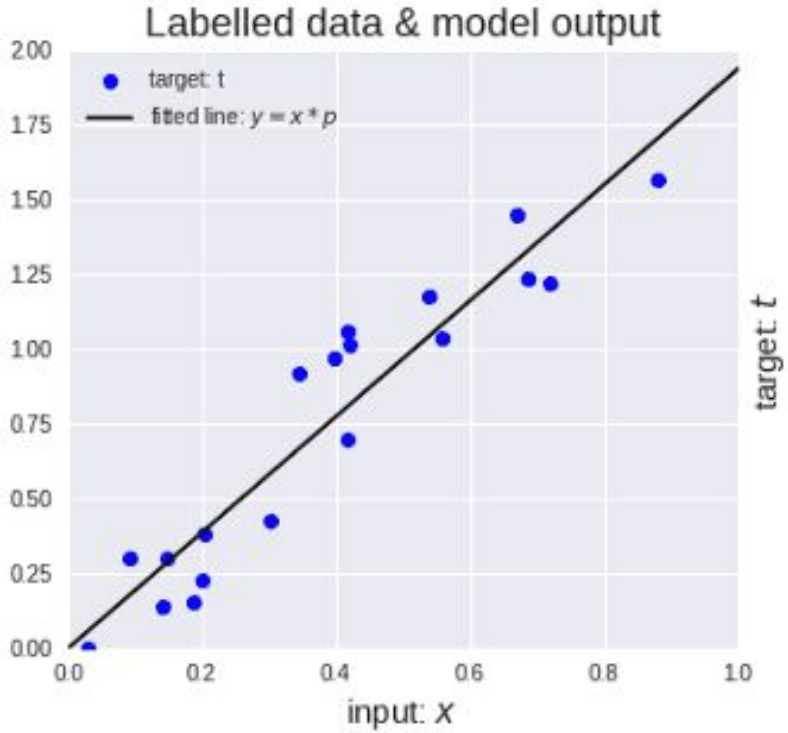
We define a function E(W) which quantify the error we observe on the examples.

i.e: Euclidean distance between the target and f(X)

$$E(W) = \frac{1}{2}\sum_{i=0}^{n}(W.X_i^T - Y_i)^2$$



3d visualization of multiple regression



Linear regression : gradient descent

$$E(W) = \frac{1}{2}\sum_{i=0}^{n}(W.X_i^T - Y_i)^2$$

The least squared loss of a linear model is a convex function ("bowl-shaped")

One simple way to find its minimum is by **following the slope of the error**.

$$W \leftarrow W + \alpha\frac{\delta E}{\delta W}$$

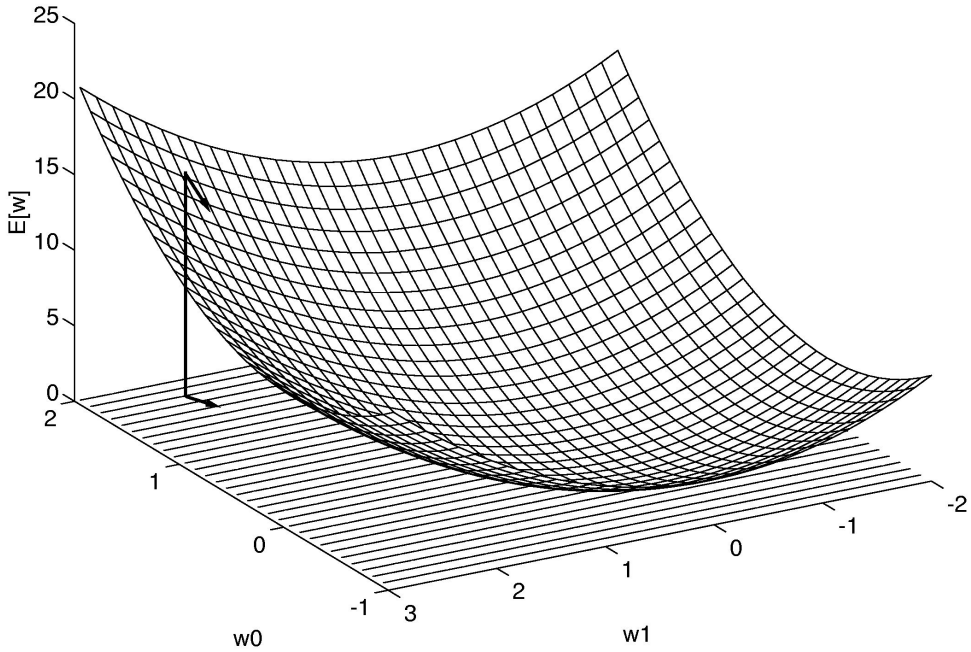
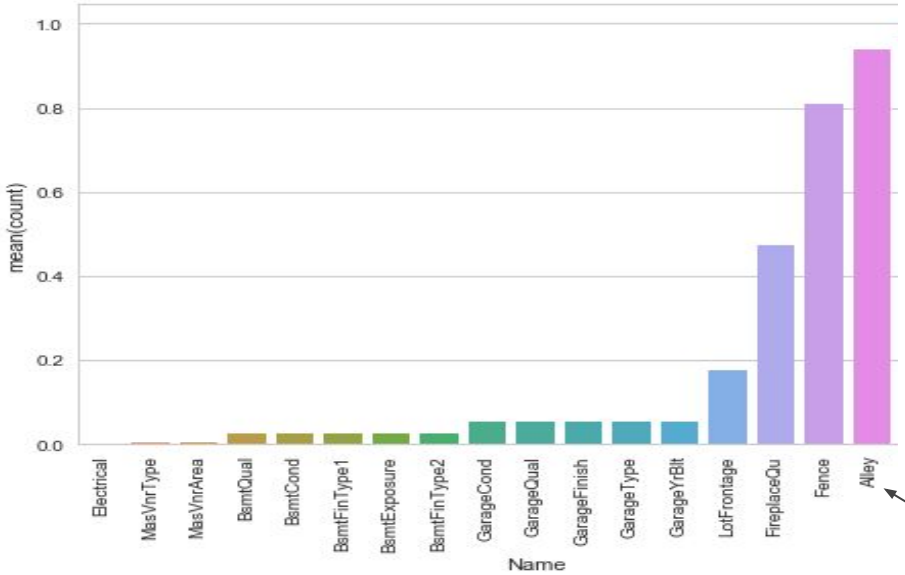


Illustration: Tom Mitchell, McGraw-Hill

Univariate Analysis - Plot the missing values count



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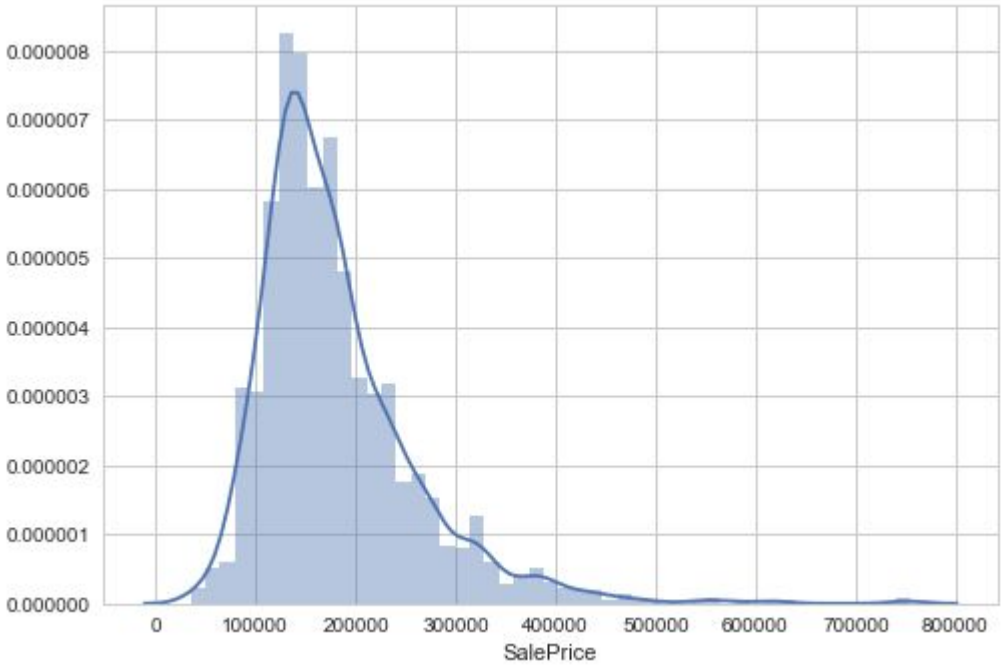
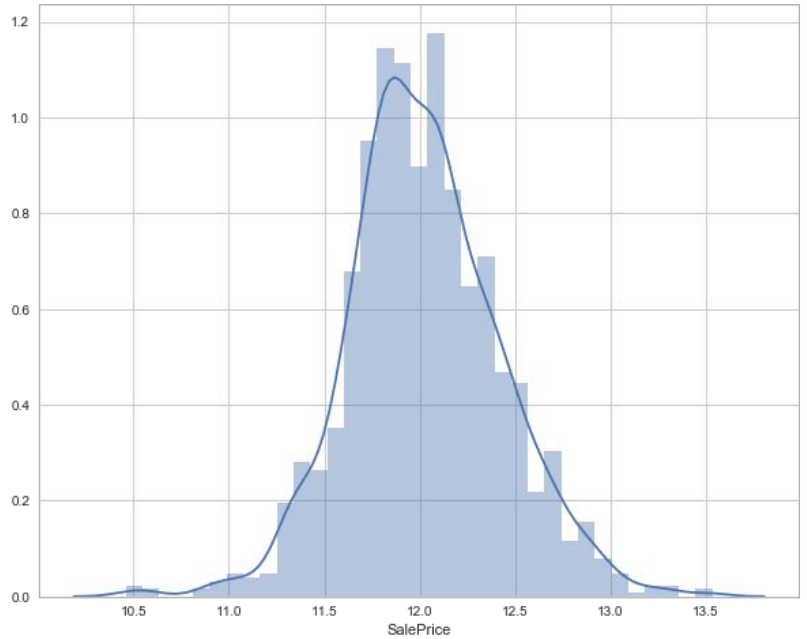
5	60	RL	84.0	14260	Pave	NaN	IR1	Lvl	AllPub

Univariate Analysis - Transformation of Target Variable - Sales Prices

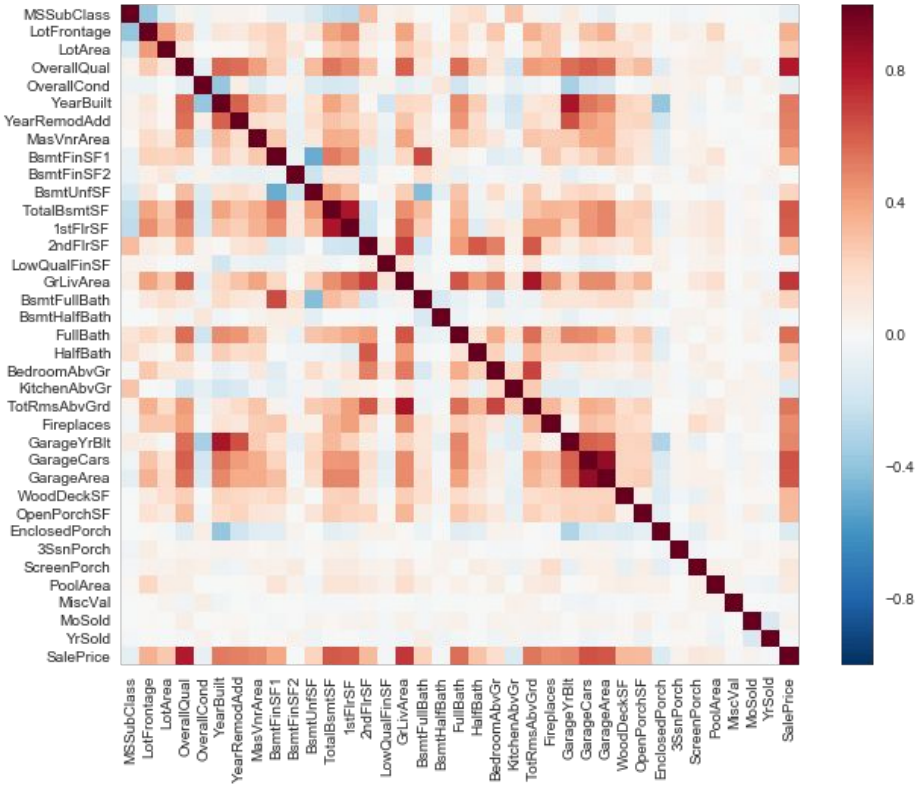


Right Skewed distribution



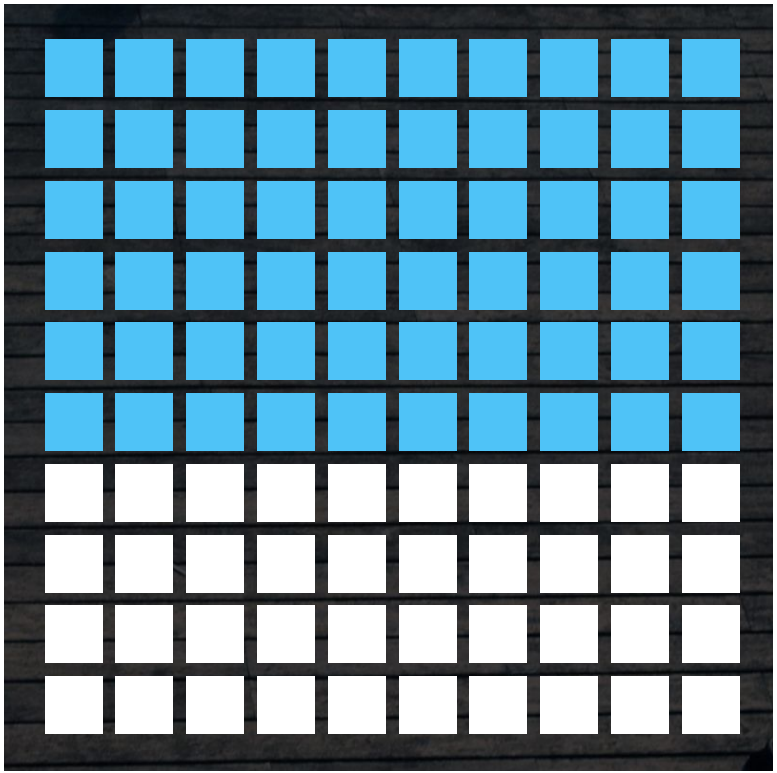
Normal Distribution

Bivariate Analysis - Transformation of Target Variable - Sales Prices



Features

House IDs



Training Set

Test Set

Model Building using training set

Cross Validation

Prediction using test set