

February 2016

AUG  
OCT to

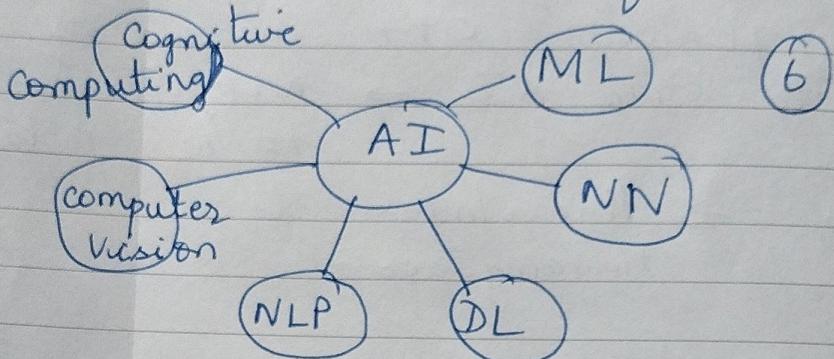
## AI Bootcamp - 3 months

2 033-333  
Tuesday

appointments  
D8/02/2024

### 1) Beginner Level Understanding of ML Algorithms:

- Core branches of AI:



1) AI : enabling machines to mimic human like behavior

3 034-332  
Wednesday

2) Algorithms : - sequence of steps to perform a specific task

3) Machines → here, refers to computer pgms/ algorithms that do.

4) ML → subset of AI, that learns from data, make decisions with little or no human interference.

Eg: Data about cats/dogs are fed and then learn to make classifications using math based algorithms

Add perspiration to your inspiration.

	January	February	March	April	May	June	July	August	September	October	November	December	2016
SUN	1 8 15 22 29	1 8 15 22 29	7 14 21 28	4 11 18 25	30 2 9 16 23	6 13 20 27	1 8 15 22 29	5 12 19 26	1 8 15 22 29	31 3 10 17 24	7 14 21 28	5 12 19 26	MON
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4 Thursday  
035-331

appointments

## Types of Machine Learning

supervised Learning

trained with  
Label data  
to  
classify the  
data and  
predict  
outcome

Unsupervised Learning

uses unlabelled  
data to  
train and  
identify the  
hidden data  
patterns

semi-  
supervised  
Learning

Re-inforcement  
Learning

5 036-330  
Friday

appointments

classification

Regression

clustering

Dimensionality  
Reduction

Association

deals with  
categorical  
outputs

deals with  
continuous  
values

Linear Regression

SVM

Random Forest

Decision Trees

⑥ Logistic  
Regression

SVM

Naive Bayes

KNN

Random  
Forest

Decision  
Trees

All glory comes from daring to begin.

February 2016

6 Saturday  
037-329

appointments

clustering  
K-Means

Hierarchical clustering

Unsupervised Learning

Association

Apriori  
Algorithm

Dimensionality  
Reduction  
↓  
PCA

Eg :- Market  
Basket  
Analysis

7 038-328  
Sunday

appointments

Semi-supervised  
Learning

classification

clustering

→ partial  
supervised &  
unsupervised

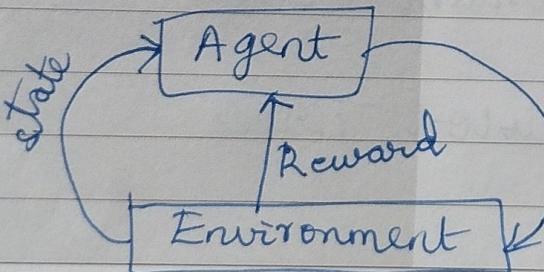
Week 5

↓  
useful when  
abundant  
unlabelled  
data  
available &  
obtaining  
labelled data  
is  
expensive

Re-inforcement  
Learning

→ Learning  
through  
'Trial & Error'  
method

→ Learning from  
mistakes



All our dreams can come true, if we have the courage to pursue them.

	MON	TUE	WED	THU	FRI	SAT	SUN
WEEK	1	2	3	4	5	6	7
1	8	15	22	29	-	-	-
2	9	16	23	-	-	-	-
3	10	17	24	-	-	-	-
4	11	18	25	-	-	-	-
5	12	19	26	-	-	-	-
6	13	20	27	-	-	-	-
7	14	21	28	-	-	-	-
8	15	22	29	-	-	-	-
9	16	23	30	-	-	-	-
10	17	24	31	-	-	-	-
11	18	25	-	-	-	-	-
12	19	26	-	-	-	-	-
13	20	27	-	-	-	-	-
14	21	28	-	-	-	-	-
15	22	29	-	-	-	-	-
16	23	30	-	-	-	-	-
17	24	31	-	-	-	-	-
18	25	-	-	-	-	-	-
19	26	-	-	-	-	-	-
20	27	-	-	-	-	-	-
21	28	-	-	-	-	-	-
22	29	-	-	-	-	-	-
23	24	-	-	-	-	-	-
24	25	-	-	-	-	-	-
25	26	-	-	-	-	-	-
26	27	-	-	-	-	-	-
27	28	-	-	-	-	-	-
28	29	-	-	-	-	-	-
29	30	-	-	-	-	-	-
30	31	-	-	-	-	-	-
31	32	-	-	-	-	-	-

8 Monday  
039-327  
appointments

## Reinforcement Learning

→ Q - Learning  
→ R - Learning  
→ TD Learning

2016  
MON  
TUE  
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FRI  
SAT  
SUN  
WEEK

Week 6

## Machine Learning Models:

### 1) Logistic Regression

↓  
counterpart of  
Linear Regression

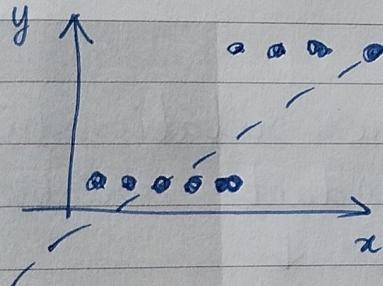
$$y = mx + b$$

Binary classification → Yes  
No

Multi-class classification → Positive  
Neutral  
Negative

9 040-326 Tuesday  
appointments

For binary classfr.,



Line of Best fit → this is how Lin. Reg. calculated for Log. Reg pblm

∴ Sigmoid curve / used → to find probability of occurrence and not the value of variable  
Logistic function /  
Logit function  
 $f(z)$

$$z = b_0 x_0 + b_1 x_1 + \dots + b_n x_n + c$$

$$f(z) = \frac{1}{1 + e^{-z}}$$

$$+ b_n x_n + c$$

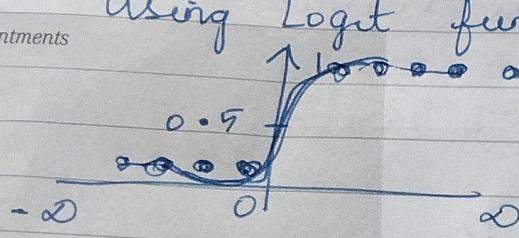
Alone we can do so little; together we can do so much.

February 2016

10 041-325  
Wednesday

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Using Logit function:



Model Parameters:

Maximum Likelihood Method

Logistic Regression

Least Squares Method

Linear Regression

→ Lin. Reg → independant variable

correlates with dependant variable

→ Log. Reg → ind. vari helps in clearly distinguishing dep. variable (Yes / No - 0/1)

11 042-324  
Thursday

appointments

2) Linear Regression:

↳ Aiming to depict the relationship between dependant and independant variables

↓  
response variable

↓  
predictor variables

↳ Simple Linear Regression → single ind.var.

↳ Multiple Linear Regression → with multiple independant variables

2016  
MON  
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WEEK

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12 Friday

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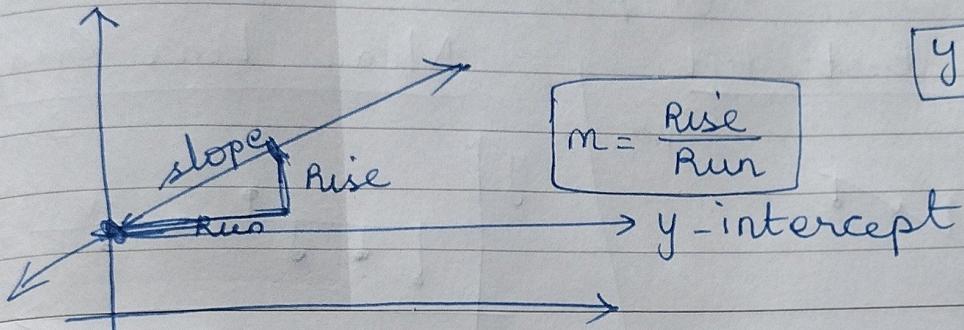
↳ Both the types can be explained using a Linear Equation,

$$y = mx + b \rightarrow y\text{-intercept}$$

↓  
 dependant variable

↳ independant variable  
 ↳ slope

↳ simple Lin. Reg.



$$y = \beta_0 + \beta_1 x + c$$

044-322  
13 Saturday

Week 6

## Multiple Linear Regression:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \epsilon$$

↳ Error term

### Model Fitting:

↳ Least squares Method:

- minimising the sum of squared (SS) residuals

$$SS(\text{residuals}) = \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

↳ True Value      Estimated value  
 ↳ Predicted

Always do what you know to be the best, even if it is the most difficult thing to do.

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Sunday

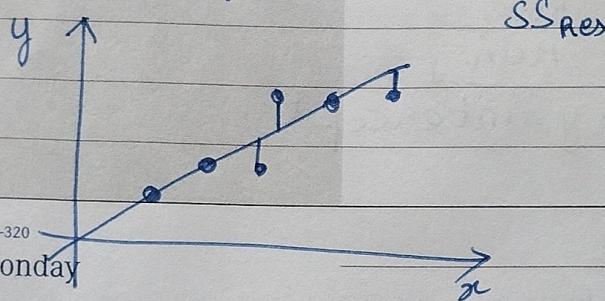
appointments

### Model Evaluation:

$$R^2 = 1 - \frac{SS_{\text{Res}}}{SS_{\text{TOT}}} = 1 - \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \bar{y})^2}$$

(i.e)  $= 1 - \frac{\text{Line of Best Fit}}{\text{Mean Line graph}}$

Eg:- Line of Best Fit:

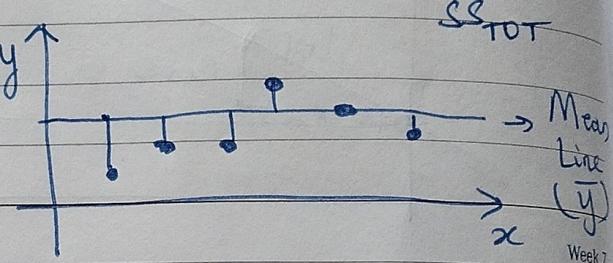


15

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Monday

Mean Line Graph



appointments

$\therefore SS_{\text{Res}}$  will have small term residuals compared to  $SS_{\text{TOT}}$

$$\therefore R^2 = 1 - \frac{\text{small Term}}{\text{Large Term}}$$

$$= 1 - \text{small Term}$$

$R^2$  = value closer to 1

$\therefore$  Model's best fit lies in smaller residuals,  
 $R^2$  value closer to 1.

2016  
MON  
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3  
appointments

## Linear Regression

- 1) ↳ Predicts continuous dependent variables based on one or more independent variables

2) Linear Eqn :-

$$y = \beta_0 + \beta_1 x_1 + \dots + \beta_n x_n + \epsilon$$

- ↳ Predicting binary or categorical dependent variable based on independent variables

$$\rightarrow \text{logit}(p) = \ln\left(\frac{p}{1-p}\right)$$

$$f(z) = \frac{1}{1+e^{-z}}$$

$$z = \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + c$$

17  
048-318  
Wednesday

3) Model Parameters:  
Ordinary Least Squares (OLS) method

appointments  
is used to minimise squared residuals

→ Maximum Likelihood Estimation (MLE) is used to find the maximum likelihood of data occurrence

4) Model Evaluation:

- ↳ R Square
- ↳ Adjusted R<sup>2</sup>
- ↳ RMSE
- ↳ MAE

→ Metrics used for evaluation are

- ↳ Accuracy
- ↳ Precision
- ↳ Recall
- ↳ F1 Score
- ↳ ROC AUC - ROC