SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

23AMB201 - MACHINE LEARNING

II YEAR IV SEM

UNIT I – INTRODUCTION

TOPIC 4– Statistics for Machine Learning(Cont..)

Outlier, Noise and Error

Noise: Irrelevant

dataset.

Student ID	Student Name	Age	GPA	Classification
100122014	Joseph	21	3.5	Junior
100232015	Patrick	200	3.2	Sophomore
100122012	Seller	24	3.0	Senior
100342013	Roger	23	234	Senior
100942012	Davis	2.8	3.7	Sophomore
	Travis	23	3.4	Sr
100982015	Alex	27		Sophomore
100982013	Trevor	-22	4.0	Senior
AUC2016XC	Aman	30	3.5	Jr

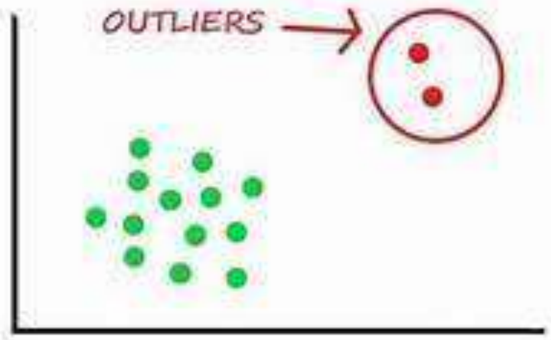
Missing Data

Inconsistent Data

Noisy Data

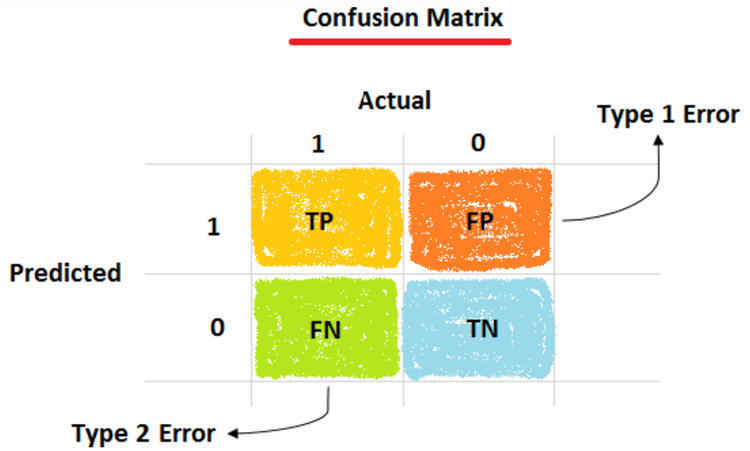
	Name	Age	Gender	Marks
0	Jai	17	M	90
1	Princi	17	F	76
2	Gaurav	18	M	NaN
3	Anuj	17	M	74
4	Ravi	18	M	65
5	Natasha	17	F	NaN
6	Riya	17	F	71

Outlier: relevant one, but so far from actual data



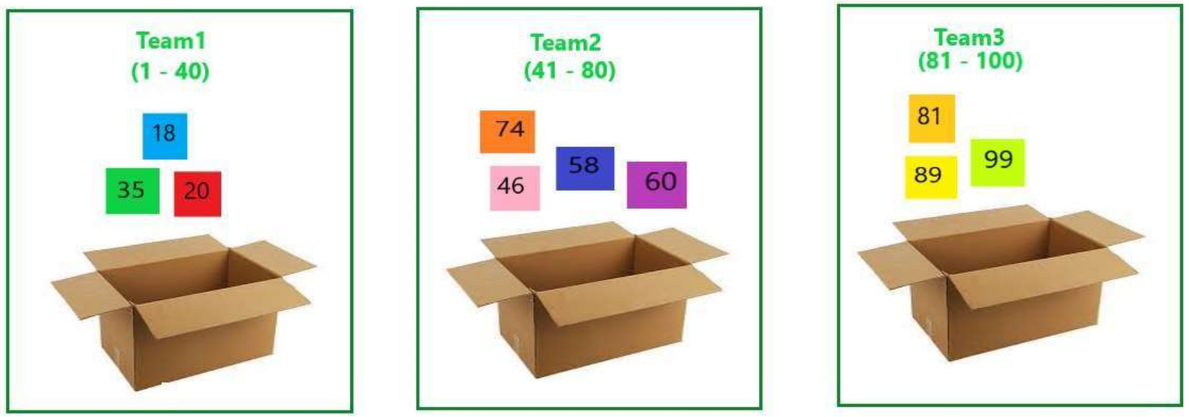
Bill Amount	Tips
500	25
500	35
600	40
300	20
500	20
500	140

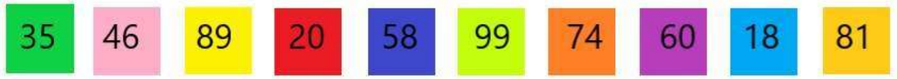
Error:



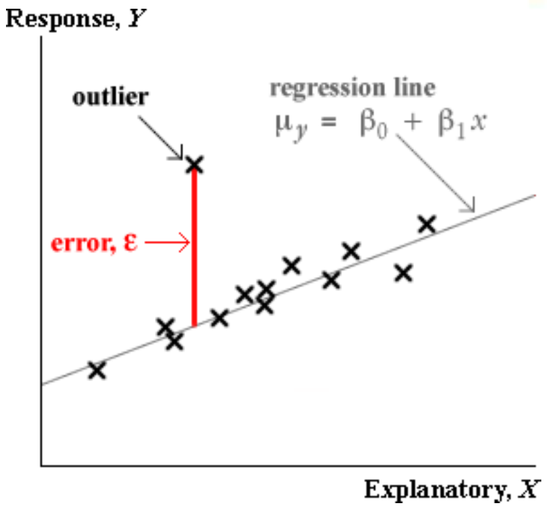
Types of Noise

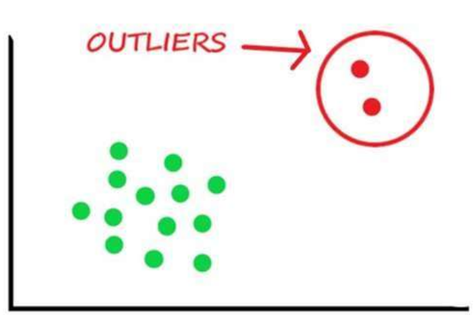

Binning
Regression
Clustering
Cutlier Analysis
Ways of
Removing Noise

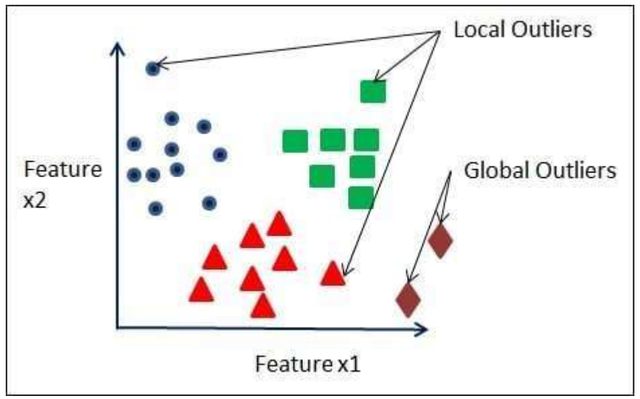

Team1
(1 - 40)
18
35
20
Team2
(41 - 80)
74
46
58
60
Team3
(81 - 100)
81
89
99


35
46
89
20
58
99
74
60
18
81

Data


Response, Y
outlier
regression line
$\mu_y = \beta_0 + \beta_1 x$
error, ε
Explanatory, X


OUTLIERS


Local Outliers
Global Outliers
Feature
x2
Feature x1

Data Wrangling

```
import pandas as pd

# Assign data
data = {'Name': ['Jai', 'Princi', 'Gaurav',
                 'Anuj', 'Ravi', 'Natasha', 'Riya'],
        'Age': [17, 17, 18, 17, 18, 17, 17],
        'Gender': ['M', 'F', 'M', 'M', 'M', 'F', 'F'],
        'Marks': [90, 76, 'NaN', 74, 65, 'NaN', 71]}

# Convert into DataFrame
df = pd.DataFrame(data)

# Display data
df
```

	Name	Age	Gender	Marks
0	Jai	17	M	90
1	Princi	17	F	76
2	Gaurav	18	M	NaN
3	Anuj	17	M	74
4	Ravi	18	M	65
5	Natasha	17	F	NaN
6	Riya	17	F	71

Data Wrangling(Mean)

	Name	Age	Gender	Marks
0	Jai	17	M	90
1	Princi	17	F	76
2	Gaurav	18	M	NaN
3	Anuj	17	M	74
4	Ravi	18	M	65
5	Natasha	17	F	NaN
6	Riya	17	F	71

```
c = avg = 0
for ele in df['Marks']:
    if str(ele).isnumeric():
        c += 1
        avg += ele
avg /= c

# Replace missing values
df = df.replace(to_replace="NaN",
                value=avg)

# Display data
df
```

	Name	Age	Gender	Marks
0	Jai	17	M	90.0
1	Princi	17	F	76.0
2	Gaurav	18	M	75.2
3	Anuj	17	M	74.0
4	Ravi	18	M	65.0
5	Natasha	17	F	75.2
6	Riya	17	F	71.0

References

1. Aurélien Géron "Hands-On Machine Learning with Scikit-Learn and TensorFlow" Publisher(s): O'Reilly Media, Inc 2017.