8:11

Session on KNN Part 1 HOME INSERT DRAW VIEW

Stop

KNN Intuition

22 May 2023 19:14

You are the average of the five people you spend the most time with

- Jim Rohn

Knn → simple/elegant

100 student

cgpa	iq	placement
8	80	1
7	70	0
.	.	.
.	.	.
.	.	.

ml model

{ cgpa, iq } → placement

knn

8:15

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Stop

- Jim Rohn

euclidean

knn

iq

cgpa

class label 1

x → 1

x → 0

K=3

100 distance → 3 nearest neighbors

↳ sort ascending

closest

↳ majority count

1 1 0 → (1)

8:16

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Stop

2D → n-D

cgpa

closest

↳ majority count

1 1 0 → (1)

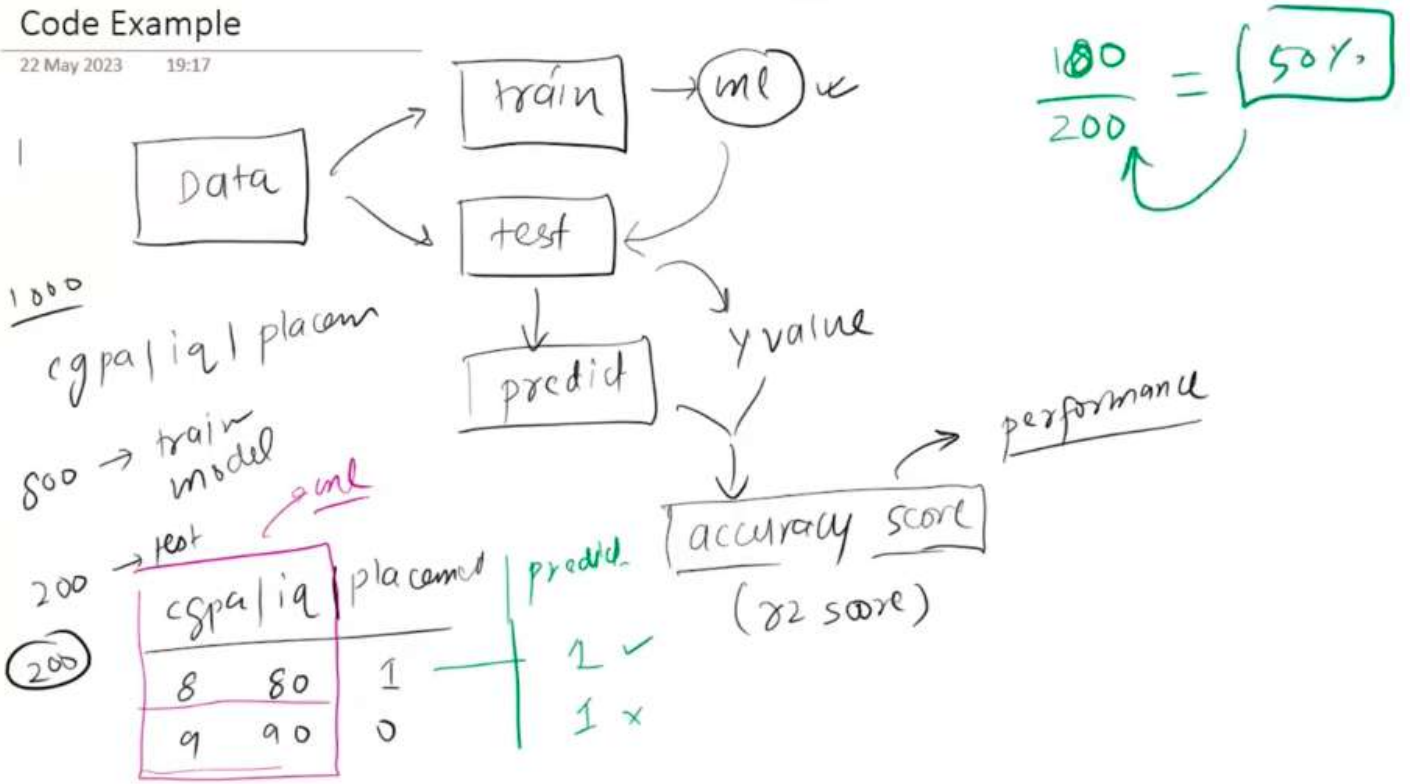
↑ ↑ ↑

$x_1 \mid x_2 \mid x_3 \ldots x_n$ n-dim

3 vectors → majority count → class label of query point

Code Example

22 May 2023 19:17



OneNote for Windows 10

Nitish Singh

Home Insert Draw View Help

Share

Calibri 11 B I U

Heading 1

DSMP 2022-23

Session 3...
Session 4...
Session 1...
Session on...
Session 2...
Session 3...
Session on...
Session on...
Doubt Cle...
New Secti...
Session on...
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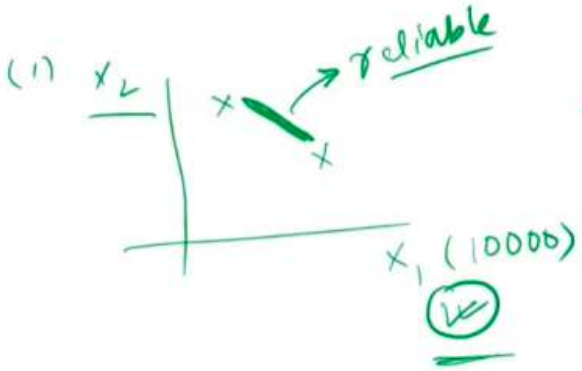
Session on...

KNN Intuition
Code Example
How to select K?
Decision Surface
Overfitting and Underfit...
Weighted KNN
KNN for Regression
Limitations of KNN

Add sect...
Add page



same scale

age → M, σ

72 → 7

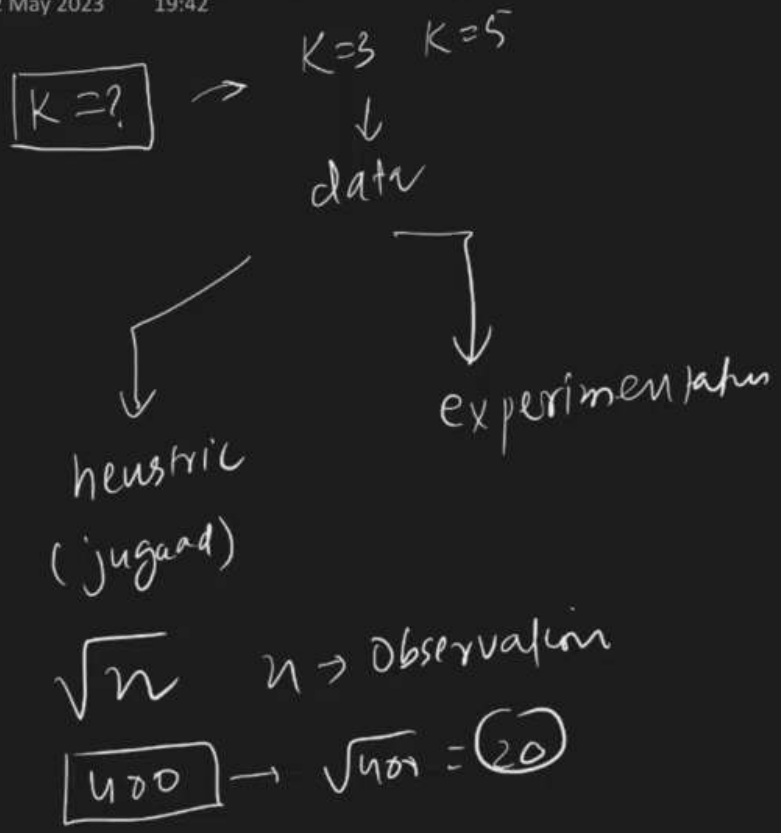
73

61

37

How to select K?

22 May 2023 19:42



9:08 23%

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Stop

data

heuristic (jugaad)

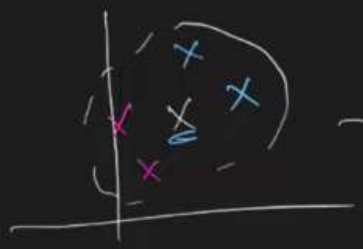
$\sqrt{n}$ $n \rightarrow$ Observation

400 $\rightarrow \sqrt{400} = 20$

even value for K

20 $\rightarrow$ 19 $\rightarrow$ 21

experimentation



K=4

2(1) 2(0)

conflict

Cross-validation

1000 = n

800 (train)

200 (test)

Stop

(jugaad)

$\sqrt{n}$ $n \rightarrow$ Observation

400 $\rightarrow$ $\sqrt{400} = 20$

even value for k

20 $\rightarrow$ 19 $\rightarrow$ 21

Cross-validation

1000 = n

800 (train) 200 (test)

run $\rightarrow$ accuracy

diff knn

knn $\rightarrow$ 1 $\rightarrow$ 83

knn $\rightarrow$ 2 $\rightarrow$ 81

knn $\rightarrow$ 3 $\rightarrow$ 87

knn $\rightarrow$ 25 $\rightarrow$ 91

10:44 38%

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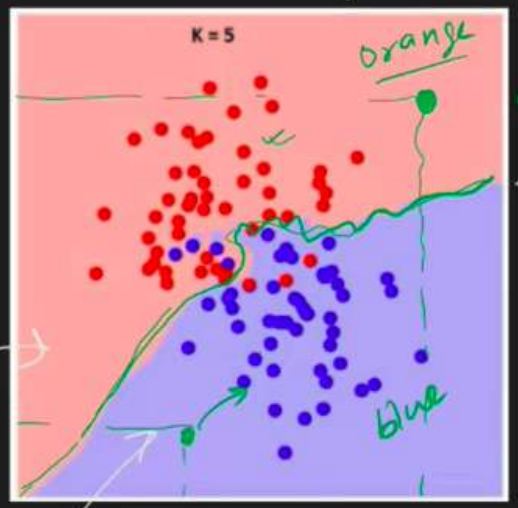
Stop

[Decision Surface] → tool → classification → knn → svm, lr, dt, nn

22 May 2023 19:15

1D 2D 3D



coordinate

disc video

cgpa | iq | place binary [0,1]

training points

cgpa

10:46 38%

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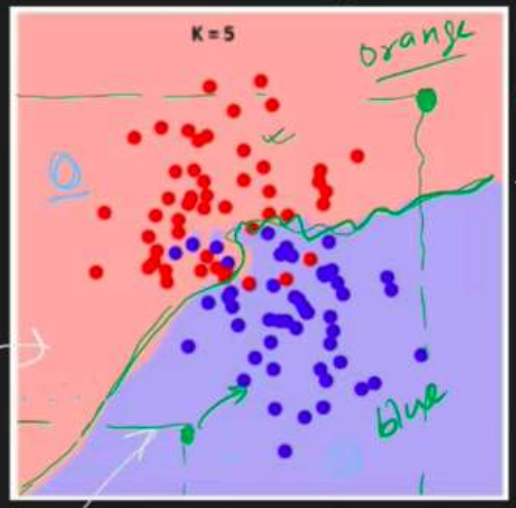
Stop



coordinate

disc video

cgpa | iq | place binary [0,1]

training points

cgpa

pixel on anim

generate a numpy meshgrid

knn train → 1
→ 0

orange

blue

7:53 49%

Session on KNN Part 1 HOME INSERT DRAW VIEW

Stop

Overfitting and Underfitting in KNN

22 May 2023 19:15

cgpa | iq | placed

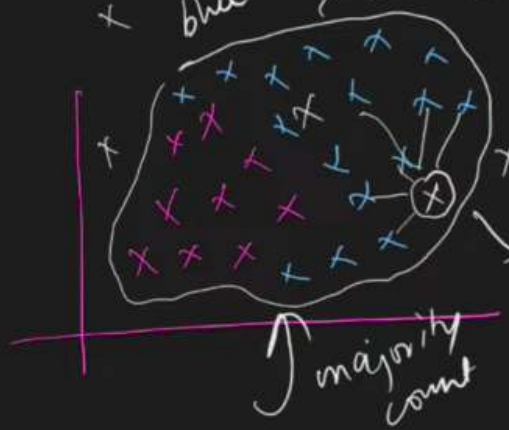
200 student

K=1

→ minor changes → overfitting

↓

high variance



blue

neighbour

K=? n=200

K=200

simplistic → blue

↓

underfitting

blue > pink

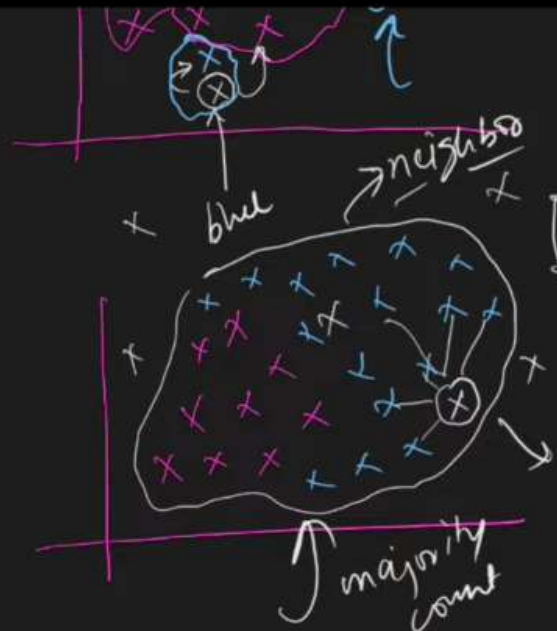
majority count

blue

7:53 49%

Session on KNN Part 1 HOME INSERT DRAW VIEW

Stop



K=?

n=200

K=200

simplistic → blue

underfitting

K = low

overfitting

K = high

underfitting

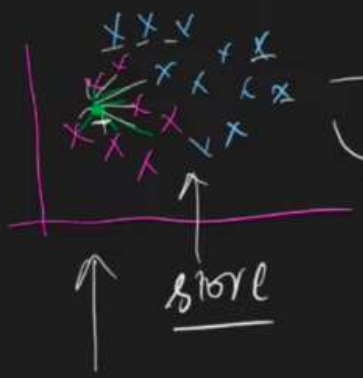
failure case

(500000, 100)

1) large datasets → n = 5L , f = 100

prediction ↓ slow → dataset

↳ Knn is a lazy learning techn



→ query point → prediction

↳ train → nothing

store

5L distance → sort → majority

low latency 3 sec → slows

8:40 46%

Session on KNN Part 1 HOME INSERT DRAW VIEW

Stop

store

Low latency [3 sec] → slows

2) High dim data → [f = 500] →

curse of dimensionality → distance concept → reliable

KNN

8:43 45%

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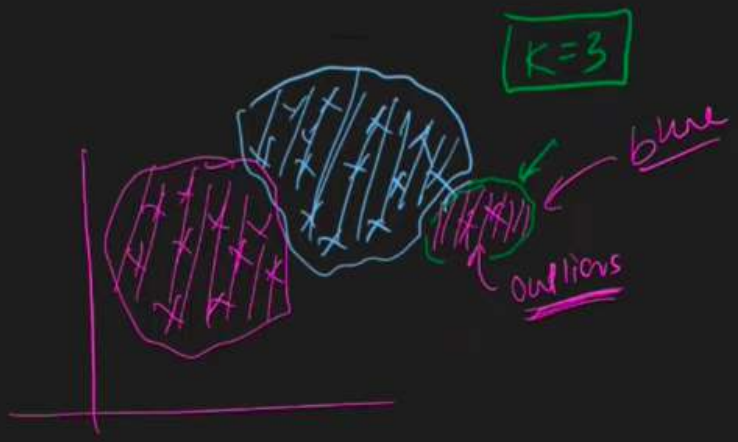
Stop

curse of dimensionality

concept

knn

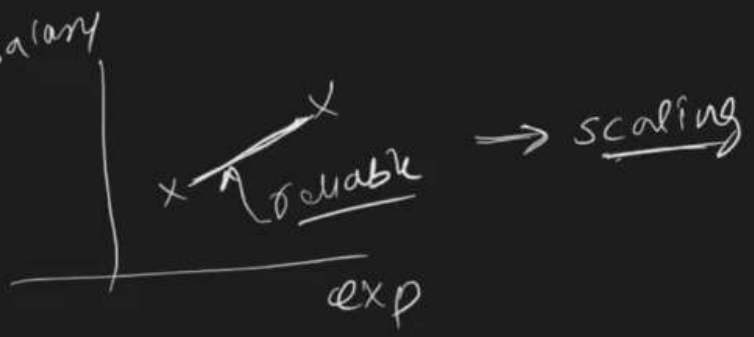
3) Outliers



4) Non- homogeneous scales

dominate

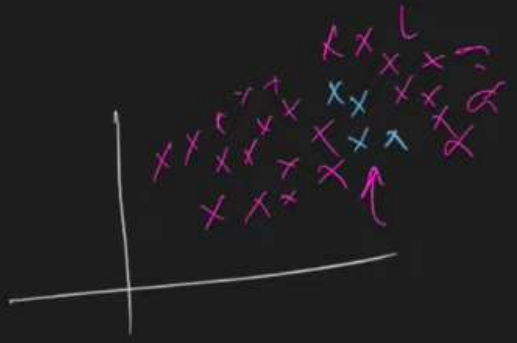
exp	salary	fire
0-25	20k-1cr	



→ scaling

0-25 20k-

5) Imbalanced dataset



↳ Yes → 98%

No → 2%

↳ biased → print

6) Inference and not for prediction

Stop

No → 2%

↳ biased → print

6) Inference and not for prediction