

final bayesian network

November 2, 2020

```
In [268]: from __future__ import print_function
import pandas as pd
import numpy as np
```

```
import matplotlib.pyplot as plt
%matplotlib inline
import sys
# Dependencies
```

```
import pandas as pd
import numpy as np
from sklearn.cluster import KMeans
from sklearn.preprocessing import LabelEncoder
from sklearn.preprocessing import MinMaxScaler
import seaborn as sns
import matplotlib.pyplot as plt
```

```
In [269]: train = pd.read_csv(r'C:\Users\cghdhv\Downloads\Bayesian Dataset.csv', encoding='ISO-8
print(train)
```

	Primary_Communications_Platform	Comm_Platform_Satisfaction(1-Yes, 0-No)	\
0	Whatsapp	1.0	
1	Mail	0.0	
2	Mail	0.0	
3	Mail	0.0	
4	Mail	1.0	
5	Mail	0.0	
6	Mail	1.0	
7	Whatsapp	0.0	
8	Slack	0.0	
9	Whatsapp	0.5	
10	Mail	0.0	
11	Mail	1.0	
12	Mail	1.0	
13	Whatsapp	0.5	
14	Mail	0.5	

15	Mail	1.0
16	Mail	1.0
17	Mail	0.5
18	Mail	0.5
19	Mail	1.0
20	Mail	1.0
21	Whatsapp	1.0
22	Whatsapp	1.0
23	Mail	0.5
24	Mail	1.0
25	Mail	1.0
26	Mail	0.5
27	None	1.0
28	Mail	1.0
29	Mail	1.0
..
42	Mail	1.0
43	Mail	0.0
44	Mail	0.5
45	Mail	0.0
46	Mail	1.0
47	Mail	0.0
48	None	0.5
49	Mail	1.0
50	Mail	1.0
51	Mail	1.0
52	Mail	0.0
53	Mail	1.0
54	Mail	1.0
55	Mail	1.0
56	Mail	1.0
57	Mail	1.0
58	Mail	1.0
59	Mail	0.0
60	Mail	0.5
61	Mail	1.0
62	Mail	1.0
63	Mail	1.0
64	Mail	1.0
65	Mail	0.0
66	Mail	1.0
67	Mail	0.5
68	Mail	1.0
69	None	0.0
70	Mail	1.0
71	Mail	1.0

Pref_Live_Lectures Pref_Audio_Lectures Pref_Recorded_Content \

0	0	0	0
1	0	0	1
2	1	0	1
3	1	0	0
4	1	0	1
5	0	0	1
6	0	0	1
7	0	0	1
8	1	1	0
9	1	0	0
10	0	0	1
11	1	0	1
12	1	0	1
13	1	0	0
14	1	0	1
15	0	0	1
16	0	0	1
17	0	0	1
18	0	0	1
19	0	0	1
20	1	0	1
21	1	0	0
22	1	0	0
23	0	0	1
24	0	1	1
25	0	0	1
26	0	0	1
27	0	0	1
28	1	0	1
29	1	0	1
..
42	1	1	1
43	0	0	0
44	1	1	1
45	0	0	1
46	0	0	1
47	1	0	1
48	0	0	1
49	0	0	0
50	1	1	1
51	1	0	0
52	1	0	1
53	1	0	1
54	1	1	1
55	1	1	0
56	1	0	1
57	1	0	1
58	0	0	1

59	0	0	1
60	0	0	1
61	1	0	1
62	1	1	1
63	0	0	1
64	1	0	1
65	1	1	1
66	1	1	1
67	0	0	1
68	1	0	1
69	1	1	1
70	0	0	1
71	0	0	1

	Pref_PowerPoint_presentation	Pref_Interactive_Sessions \
0	1	0.0
1	1	0.0
2	0	0.0
3	0	0.0
4	0	0.0
5	1	1.0
6	1	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
11	1	0.0
12	1	0.0
13	0	0.0
14	1	0.0
15	1	0.0
16	1	0.0
17	1	0.0
18	0	0.0
19	0	0.0
20	0	0.0
21	0	0.0
22	0	0.0
23	0	0.0
24	1	0.0
25	1	0.0
26	0	0.0
27	0	0.0
28	1	0.0
29	0	0.0
..
42	1	1.0
43	0	1.0

44	0	1.0
45	1	1.0
46	1	0.0
47	1	0.0
48	1	1.0
49	0	1.0
50	1	1.0
51	0	0.0
52	0	0.0
53	1	1.0
54	1	1.0
55	1	0.0
56	1	1.0
57	1	0.0
58	0	1.0
59	1	1.0
60	1	0.0
61	1	0.0
62	1	0.0
63	0	0.0
64	0	0.0
65	0	0.0
66	1	0.0
67	1	1.0
68	0	0.0
69	1	1.0
70	0	1.0
71	1	0.0

	Pref_ContentDelivery_mode	PercentileAbleTo_Score \
0	PowerPoint presentation	78
1	Recorded Content, PowerPoint presentation	40
2	Live Lectures, Recorded Content	50
3	Live Lectures	30
4	Live Lectures, Recorded Content	70
5	Recorded Content, PowerPoint presentation, Int...	40
6	Recorded Content, PowerPoint presentation	2
7	Recorded Content	70
8	Live Lectures, Audio Lectures	70
9	Live Lectures	80
10	Recorded Content	60
11	Live Lectures, Recorded Content, PowerPoint pr...	40
12	Live Lectures, Recorded Content, PowerPoint pr...	80
13	Live Lectures	80
14	Live Lectures, Recorded Content, PowerPoint pr...	45
15	Recorded Content, PowerPoint presentation	50
16	Recorded Content, PowerPoint presentation	70
17	Recorded Content, PowerPoint presentation	20

18	Recorded Content	60
19	Recorded Content	70
20	Live Lectures, Recorded Content	30
21	Live Lectures	80
22	Live Lectures	70
23	Recorded Content	60
24	Audio Lectures, Recorded Content, PowerPoint ...	50
25	Recorded Content, PowerPoint presentation	50
26	Recorded Content	50
27	Recorded Content	70
28	Live Lectures, Recorded Content, PowerPoint pr...	50
29	Live Lectures, Recorded Content	60
..
42	Live Lectures, Audio Lectures, Recorded Conte...	40
43	Interactive Sessions	38
44	Live Lectures, Audio Lectures, Recorded Conte...	28
45	Recorded Content, PowerPoint presentation, Int...	58
46	Recorded Content, PowerPoint presentation	60
47	Live Lectures, Recorded Content, PowerPoint pr...	56
48	Recorded Content, PowerPoint presentation, Int...	30
49	Interactive Sessions	30
50	Live Lectures, Audio Lectures, Recorded Conte...	40
51	Live Lectures	45
52	Live Lectures, Recorded Content	35
53	Live Lectures, Recorded Content, PowerPoint pr...	30
54	Live Lectures, Audio Lectures, Recorded Conte...	28
55	Live Lectures, Audio Lectures, PowerPoint pre...	35
56	Live Lectures, Recorded Content, PowerPoint pr...	30
57	Live Lectures, Recorded Content, PowerPoint pr...	30
58	Recorded Content, Interactive Sessions	32
59	Recorded Content, PowerPoint presentation, Int...	30
60	Recorded Content, PowerPoint presentation	32
61	Live Lectures, Recorded Content, PowerPoint pr...	28
62	Live Lectures, Audio Lectures, Recorded Conte...	35
63	Recorded Content	60
64	Live Lectures, Recorded Content	32
65	Live Lectures, Audio Lectures, Recorded Content	38
66	Live Lectures, Audio Lectures, Recorded Conte...	40
67	Recorded Content, PowerPoint presentation, Int...	38
68	Live Lectures, Recorded Content	48
69	Live Lectures, Audio Lectures, Recorded Conte...	34
70	Recorded Content, Interactive Sessions	60
71	Recorded Content, PowerPoint presentation	30

	Question_Difficulty	...	QuizSolutions	TextBooks	Research Papers	\
0	2	...	0	0	0	
1	3	...	1	0	0	
2	2	...	1	0	0	

3	3	...	1	0	0
4	2	...	1	1	0
5	3	...	1	1	1
6	1	...	1	1	0
7	2	...	0	0	0
8	2	...	0	0	0
9	2	...	0	0	0
10	2	...	0	0	0
11	1	...	1	0	0
12	3	...	1	1	0
13	2	...	0	0	0
14	3	...	1	0	0
15	3	...	0	0	0
16	2	...	1	0	0
17	2	...	0	0	0
18	2	...	1	1	0
19	3	...	1	0	0
20	3	...	0	0	0
21	2	...	0	0	0
22	2	...	0	0	0
23	3	...	1	1	1
24	2	...	0	0	0
25	3	...	0	0	0
26	3	...	1	0	1
27	2	...	1	1	0
28	2	...	1	1	0
29	3	...	1	0	0
..
42	3	...	1	0	0
43	3	...	1	0	0
44	3	...	1	0	0
45	3	...	1	0	0
46	2	...	1	0	0
47	3	...	1	0	0
48	3	...	1	0	0
49	3	...	1	0	0
50	3	...	1	0	0
51	3	...	1	0	0
52	3	...	1	0	0
53	3	...	1	0	0
54	3	...	1	0	0
55	3	...	1	0	0
56	3	...	1	0	0
57	3	...	1	0	0
58	3	...	1	0	0
59	3	...	1	0	0
60	3	...	1	0	0
61	3	...	1	0	0

62	3	...	1	0	0
63	2	...	0	0	0
64	3	...	1	0	0
65	3	...	1	0	0
66	3	...	1	0	0
67	3	...	1	0	0
68	3	...	1	0	0
69	3	...	1	0	0
70	2	...	1	0	0
71	3	...	1	0	0

```

Materials_provision_Platform \
0      THA(Take-Home Assignments)
1  THA(Take-Home Assignments), Practice Exercises...
2  THA(Take-Home Assignments), Practice Exercises...
3  THA(Take-Home Assignments), Practice Exercises...
4  THA(Take-Home Assignments), Reading Materials,...
5  THA(Take-Home Assignments), Practice Exercises...
6  THA(Take-Home Assignments), Practice Exercises...
7      THA(Take-Home Assignments), Practice Exercises
8          Practice Exercises, Reading Materials
9              Practice Exercises
10      THA(Take-Home Assignments), Reading Materials
11  THA(Take-Home Assignments), Practice Exercises...
12  THA(Take-Home Assignments), Reading Materials,...
13              Practice Exercises
14  THA(Take-Home Assignments), Reading Materials,...
15      THA(Take-Home Assignments)
16  THA(Take-Home Assignments), Practice Exercises...
17      THA(Take-Home Assignments), Practice Exercises
18  THA(Take-Home Assignments), Practice Exercises...
19  THA(Take-Home Assignments), Practice Exercises...
20      THA(Take-Home Assignments)
21          Practice Exercises
22          Reading Materials
23  THA(Take-Home Assignments), Practice Exercises...
24      THA(Take-Home Assignments), Reading Materials
25      THA(Take-Home Assignments), Practice Exercises
26  THA(Take-Home Assignments), Reading Materials,...
27      Reading Materials, Quiz Solutions, Textbooks
28  THA(Take-Home Assignments), Practice Exercises...
29      THA(Take-Home Assignments), Quiz Solutions
..          ...
42  THA(Take-Home Assignments), Practice Exercises...
43  THA(Take-Home Assignments), Practice Exercises...
44  THA(Take-Home Assignments), Practice Exercises...
45  THA(Take-Home Assignments), Practice Exercises...
46  THA(Take-Home Assignments), Practice Exercises...

```


47 THA(Take-Home Assignments), Practice Exercises...
 48 THA(Take-Home Assignments), Practice Exercises...
 49 THA(Take-Home Assignments), Practice Exercises...
 50 THA(Take-Home Assignments), Practice Exercises...
 51 THA(Take-Home Assignments), Practice Exercises...
 52 THA(Take-Home Assignments), Practice Exercises...
 53 THA(Take-Home Assignments), Practice Exercises...
 54 THA(Take-Home Assignments), Practice Exercises...
 55 THA(Take-Home Assignments), Practice Exercises...
 56 THA(Take-Home Assignments), Practice Exercises...
 57 THA(Take-Home Assignments), Practice Exercises...
 58 THA(Take-Home Assignments), Practice Exercises...
 59 THA(Take-Home Assignments), Practice Exercises...
 60 THA(Take-Home Assignments), Practice Exercises...
 61 THA(Take-Home Assignments), Practice Exercises...
 62 THA(Take-Home Assignments), Practice Exercises...
 63 THA(Take-Home Assignments), Reading Materials
 64 THA(Take-Home Assignments), Practice Exercises...
 65 THA(Take-Home Assignments), Practice Exercises...
 66 THA(Take-Home Assignments), Practice Exercises...
 67 THA(Take-Home Assignments), Practice Exercises...
 68 THA(Take-Home Assignments), Practice Exercises...
 69 THA(Take-Home Assignments), Practice Exercises...
 70 THA(Take-Home Assignments), Practice Exercises...
 71 THA(Take-Home Assignments), Practice Exercises...

	Tests_Assignments_in_course	Result_Show_Time	AvgDur_Tests \
0	20	72	30
1	20	72	30
2	20	72	30
3	20	72	30
4	20	72	30
5	20	72	30
6	20	72	30
7	20	72	30
8	20	72	30
9	20	72	30
10	20	72	30
11	20	72	30
12	20	72	30
13	20	72	30
14	20	72	30
15	20	72	30
16	20	72	30
17	20	72	30
18	20	72	30
19	20	72	30
20	20	72	30

21	20	72	30
22	20	72	30
23	20	72	30
24	20	72	30
25	20	72	30
26	20	72	30
27	20	72	30
28	20	72	30
29	20	72	30
..
42	20	72	30
43	20	72	30
44	20	72	30
45	20	72	30
46	20	72	30
47	20	72	30
48	20	72	30
49	20	72	30
50	20	72	30
51	20	72	30
52	20	72	30
53	20	72	30
54	20	72	30
55	20	72	30
56	20	72	30
57	20	72	30
58	20	72	30
59	20	72	30
60	20	72	30
61	20	72	30
62	20	72	30
63	20	72	30
64	20	72	30
65	20	72	30
66	20	72	30
67	20	72	30
68	20	72	30
69	20	72	30
70	20	72	30
71	20	72	30

	WeeklyHours_Browse_Platform	Portal_Login_Freq \
0	6	3
1	1	2
2	3	4
3	1	1
4	2	1
5	3	2

6	4	3
7	5	3
8	7	2
9	10	3
10	1	0
11	4	2
12	10	10
13	10	3
14	4	3
15	10	4
16	10	2
17	2	2
18	1	1
19	1	1
20	6	1
21	6	6
22	4	3
23	9	9
24	5	1
25	5	1
26	7	8
27	10	2
28	4	3
29	5	5
..
42	1	2
43	1	3
44	2	1
45	3	3
46	4	5
47	2	1
48	1	2
49	1	2
50	2	3
51	1	3
52	2	2
53	2	1
54	2	2
55	1	3
56	2	4
57	2	3
58	2	1
59	1	1
60	2	1
61	3	2
62	1	1
63	7	2
64	1	2

65	3	4
66	2	3
67	2	3
68	2	3
69	4	4
70	3	4
71	1	2

	CourseProgress_Satisfaction
0	1
1	0
2	1
3	1
4	1
5	0
6	1
7	0
8	0
9	1
10	0
11	0
12	0
13	1
14	0
15	0
16	1
17	0
18	1
19	0
20	0
21	1
22	1
23	0
24	0
25	1
26	0
27	0
28	0
29	1
..	...
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0

50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0
62	0
63	1
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0

[72 rows x 32 columns]

In [270]: train.describe()

```
Out[270]:
```

	Comm_Platform_Satisfaction(1-Yes, 0-No)	Pref_Live_Lectures \
count	72.000000	72.000000
mean	0.652778	0.527778
std	0.424918	0.502731
min	0.000000	0.000000
25%	0.375000	0.000000
50%	1.000000	1.000000
75%	1.000000	1.000000
max	1.000000	1.000000

	Pref_Audio_Lectures	Pref_Recorded_Content \
count	72.000000	72.000000
mean	0.180556	0.791667
std	0.387349	0.408966
min	0.000000	0.000000
25%	0.000000	1.000000
50%	0.000000	1.000000
75%	0.000000	1.000000
max	1.000000	1.000000

	Pref_PowerPoint_presentation	Pref_Interactive_Sessions \
count	72.000000	71.000000
mean	0.527778	0.352113
std	0.502731	0.481028
min	0.000000	0.000000
25%	0.000000	0.000000
50%	1.000000	0.000000
75%	1.000000	1.000000
max	1.000000	1.000000

	PercentileAbleTo_Score	Question_Difficulty	Curr_Live_Lectures \
count	72.000000	72.000000	72.0
mean	45.819444	2.625000	1.0
std	17.209010	0.567612	0.0
min	2.000000	1.000000	1.0
25%	31.500000	2.000000	1.0
50%	40.000000	3.000000	1.0
75%	60.000000	3.000000	1.0
max	80.000000	3.000000	1.0

	Curr_Audio_Lectures	...	ReadingMaterials	QuizSolutions	TextBooks \
count	72.0	...	72.000000	72.000000	72.000000
mean	0.0	...	0.819444	0.805556	0.111111
std	0.0	...	0.387349	0.398550	0.316475
min	0.0	...	0.000000	0.000000	0.000000
25%	0.0	...	1.000000	1.000000	0.000000
50%	0.0	...	1.000000	1.000000	0.000000
75%	0.0	...	1.000000	1.000000	0.000000
max	0.0	...	1.000000	1.000000	1.000000

	Research Papers	Tests_Assignments_in_course	Result_Show_Time \
count	72.000000	72.0	72.0
mean	0.041667	20.0	72.0
std	0.201229	0.0	0.0
min	0.000000	20.0	72.0
25%	0.000000	20.0	72.0
50%	0.000000	20.0	72.0
75%	0.000000	20.0	72.0
max	1.000000	20.0	72.0

	AvgDur_Tests	WeeklyHours_Browse_Platform	Portal_Login_Freq \
count	72.0	72.000000	72.000000
mean	30.0	3.361111	2.597222
std	0.0	2.702662	1.781436
min	30.0	1.000000	0.000000
25%	30.0	1.000000	1.000000
50%	30.0	2.000000	2.000000
75%	30.0	4.000000	3.000000

max	30.0	10.000000	10.000000
-----	------	-----------	-----------

	CourseProgress_Satisfaction
count	72.000000
mean	0.208333
std	0.408966
min	0.000000
25%	0.000000
50%	0.000000
75%	0.000000
max	1.000000

[8 rows x 28 columns]

In [271]: train.head()

```
Out[271]: Primary_Communic_Platfrom  Comm_Platform_Satisfaction(1-Yes, 0-No) \
0           Whatsapp                  1.0
1           Mail                    0.0
2           Mail                    0.0
3           Mail                    0.0
4           Mail                    1.0

Pref_Live_Lectures  Pref_Audio_Lectures  Pref_Recorded_Content \
0           0           0           0
1           0           0           1
2           1           0           1
3           1           0           0
4           1           0           1

Pref_PowerPoint_presentation  Pref_Interactive_Sessions \
0           1           0.0
1           1           0.0
2           0           0.0
3           0           0.0
4           0           0.0

Pref_ContentDelivery_mode  PercentileAbleTo_Score \
0           PowerPoint presentation                78
1  Recorded Content, PowerPoint presentation        40
2           Live Lectures, Recorded Content        50
3           Live Lectures                        30
4           Live Lectures, Recorded Content        70

Question_Difficulty  ... QuizSolutions  TextBooks  Research Papers \
0           2  ...           0           0           0
1           3  ...           1           0           0
2           2  ...           1           0           0
```

3	3	...	1	0	0
4	2	...	1	1	0

	Materials_provision_Platform	\
0	THA(Take-Home Assignments)	
1	THA(Take-Home Assignments), Practice Exercises...	
2	THA(Take-Home Assignments), Practice Exercises...	
3	THA(Take-Home Assignments), Practice Exercises...	
4	THA(Take-Home Assignments), Reading Materials,...	

	Tests_Assignments_in_course	Result_Show_Time	AvgDur_Tests	\
0	20	72	30	
1	20	72	30	
2	20	72	30	
3	20	72	30	
4	20	72	30	

	WeeklyHours_Browse_Platform	Portal_Login_Freq	CourseProgress_Satisfaction
0	6	3	1
1	1	2	0
2	3	4	1
3	1	1	1
4	2	1	1

[5 rows x 32 columns]

```
In [272]: encodings = train.groupby('Primary_Communications_Platform')['CourseProgress_Satisfaction'].me
train = train.merge(encodings, how='left', on='Primary_Communications_Platform')
train.drop('Primary_Communications_Platform', axis=1, inplace=True)
```

```
In [273]: train.head()
```

```
Out[273]:
```

	Comm_Platform_Satisfaction(1-Yes, 0-No)	Pref_Live_Lectures	\
0	1.0	0	
1	0.0	0	
2	0.0	1	
3	0.0	1	
4	1.0	1	

	Pref_Audio_Lectures	Pref_Recorded_Content	Pref_PowerPoint_presentation	\
0	0	0	1	
1	0	1	1	
2	0	1	0	
3	0	0	0	
4	0	1	0	

	Pref_Interactive_Sessions	Pref_ContentDelivery_mode	\
0	0.0	PowerPoint presentation	

1	0.0	Recorded Content, PowerPoint presentation
2	0.0	Live Lectures, Recorded Content
3	0.0	Live Lectures
4	0.0	Live Lectures, Recorded Content

	PercentileAbleTo_Score	Question_Difficulty \
0	78	2
1	40	3
2	50	2
3	30	3
4	70	2

	Curr_ContentDelivery_Mode ...	TextBooks \
0	PowerPoint Presentation ...	0
1	Live Lectures ...	0
2	Live Lectures, Recorded Content, PowerPoint Pr...	0
3	Live Lectures ...	0
4	Live Lectures, Recorded Content ...	1

	Research Papers	Materials_provision_Platform \
0	0	THA(Take-Home Assignments)
1	0	THA(Take-Home Assignments), Practice Exercises...
2	0	THA(Take-Home Assignments), Practice Exercises...
3	0	THA(Take-Home Assignments), Practice Exercises...
4	0	THA(Take-Home Assignments), Reading Materials,...

	Tests_Assignments_in_course	Result_Show_Time	AvgDur_Tests \
0	20	72	30
1	20	72	30
2	20	72	30
3	20	72	30
4	20	72	30

	WeeklyHours_Browse_Platform	Portal_Login_Freq \
0	6	3
1	1	2
2	3	4
3	1	1
4	2	1

	CourseProgress_Satisfaction_x	CourseProgress_Satisfaction_y
0	1	0.833333
1	0	0.163934
2	1	0.163934
3	1	0.163934
4	1	0.163934

[5 rows x 32 columns]

```
In [274]: train.rename(columns={'CourseProgress_Satisfaction_y': 'Prim_Comm_Platform'}, inplace=
```

```
In [275]: train.head()
```

```
Out[275]:
```

	Comm_Platform_Satisfaction(1-Yes, 0-No)	Pref_Live_Lectures	\
0	1.0	0	
1	0.0	0	
2	0.0	1	
3	0.0	1	
4	1.0	1	

	Pref_Audio_Lectures	Pref_Recorded_Content	Pref_PowerPoint_presentation	\
0	0	0	1	
1	0	1	1	
2	0	1	0	
3	0	0	0	
4	0	1	0	

	Pref_Interactive_Sessions	Pref_ContentDelivery_mode	\
0	0.0	PowerPoint presentation	
1	0.0	Recorded Content, PowerPoint presentation	
2	0.0	Live Lectures, Recorded Content	
3	0.0	Live Lectures	
4	0.0	Live Lectures, Recorded Content	

	PercentileAbleTo_Score	Question_Difficulty	\
0	78	2	
1	40	3	
2	50	2	
3	30	3	
4	70	2	

	Curr_ContentDelivery_Mode	... TextBooks	\
0	PowerPoint Presentation	...	0
1	Live Lectures	...	0
2	Live Lectures, Recorded Content, PowerPoint Pr...	...	0
3	Live Lectures	...	0
4	Live Lectures, Recorded Content	...	1

	Research Papers	Materials_provision_Platform	\
0	0	THA(Take-Home Assignments)	
1	0	THA(Take-Home Assignments), Practice Exercises...	
2	0	THA(Take-Home Assignments), Practice Exercises...	
3	0	THA(Take-Home Assignments), Practice Exercises...	
4	0	THA(Take-Home Assignments), Reading Materials,...	

	Tests_Assignments_in_course	Result_Show_Time	AvgDur_Tests	\
0	20	72	30	

1	20	72	30
2	20	72	30
3	20	72	30
4	20	72	30

	WeeklyHours_Browse_Platform	Portal_Login_Freq	\
0	6	3	
1	1	2	
2	3	4	
3	1	1	
4	2	1	

	CourseProgress_Satisfaction_x	Prim_Comm_Platform
0	1	0.833333
1	0	0.163934
2	1	0.163934
3	1	0.163934
4	1	0.163934

[5 rows x 32 columns]

In [276]: train.drop(columns="Curr_ContentDelivery_Mode", inplace=True)

In [277]: train.drop(columns="Materials_provision_Platform", inplace=True)

In [278]: train.drop(columns="Pref_ContentDelivery_mode", inplace=True)

In [279]: train.head()

Out[279]:

	Comm_Platform_Satisfaction(1-Yes, 0-No)	Pref_Live_Lectures	\
0	1.0	0	
1	0.0	0	
2	0.0	1	
3	0.0	1	
4	1.0	1	

	Pref_Audio_Lectures	Pref_Recorded_Content	Pref_PowerPoint_presentation	\
0	0	0		1
1	0	1		1
2	0	1		0
3	0	0		0
4	0	1		0

	Pref_Interactive_Sessions	PercentileAbleTo_Score	Question_Difficulty	\
0	0.0	78		2
1	0.0	40		3
2	0.0	50		2
3	0.0	30		3
4	0.0	70		2

	Curr_Live_Lectures	Curr_Audio_Lectures	...	QuizSolutions	TextBooks	\
0	1	0	...	0	0	
1	1	0	...	1	0	
2	1	0	...	1	0	
3	1	0	...	1	0	
4	1	0	...	1	1	

	Research Papers	Tests_Assignments_in_course	Result_Show_Time	\
0	0	20	72	
1	0	20	72	
2	0	20	72	
3	0	20	72	
4	0	20	72	

	AvgDur_Tests	WeeklyHours_Browse_Platform	Portal_Login_Freq	\
0	30	6	3	
1	30	1	2	
2	30	3	4	
3	30	1	1	
4	30	2	1	

	CourseProgress_Satisfaction_x	Prim_Comm_Platform
0	1	0.833333
1	0	0.163934
2	1	0.163934
3	1	0.163934
4	1	0.163934

[5 rows x 29 columns]

```
In [280]: train.rename(columns = {'Comm_Platform_Satisfaction(1-Yes, 0-No)': 'A', 'Pref_Live_Lectures': 'B',
                                'Pref_Audio_Lectures': 'C', 'Pref_Recorded_Content': 'D',
```

```
In [ ]:
```

```
In [281]: train.head()
```

```
Out[281]:
```

	A	B	C	D	E	F	G	H	I	J	...	T	U	V	X	Y	Z	AA	AB	AC	\
0	1.0	0	0	0	1	0.0	78	2	1	0	...	0	0	0	20	72	30	6	3	1	
1	0.0	0	0	1	1	0.0	40	3	1	0	...	1	0	0	20	72	30	1	2	0	
2	0.0	1	0	1	0	0.0	50	2	1	0	...	1	0	0	20	72	30	3	4	1	
3	0.0	1	0	0	0	0.0	30	3	1	0	...	1	0	0	20	72	30	1	1	1	
4	1.0	1	0	1	0	0.0	70	2	1	0	...	1	1	0	20	72	30	2	1	1	

	AD
0	0.833333
1	0.163934
2	0.163934

```
3 0.163934
4 0.163934
```

```
[5 rows x 29 columns]
```

```
In [282]: train.columns
```

```
Out[282]: Index(['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N',
                'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'X', 'Y', 'Z', 'AA', 'AB', 'AC',
                'AD'],
                dtype='object')
```

```
In [283]: import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy_score
import matplotlib.pyplot as plt
import seaborn as sns
```

```
In [284]: train.head()
```

```
Out[284]:
```

	A	B	C	D	E	F	G	H	I	J	...	T	U	V	X	Y	Z	AA	AB	AC	\
0	1.0	0	0	0	1	0.0	78	2	1	0	...	0	0	0	20	72	30	6	3	1	
1	0.0	0	0	1	1	0.0	40	3	1	0	...	1	0	0	20	72	30	1	2	0	
2	0.0	1	0	1	0	0.0	50	2	1	0	...	1	0	0	20	72	30	3	4	1	
3	0.0	1	0	0	0	0.0	30	3	1	0	...	1	0	0	20	72	30	1	1	1	
4	1.0	1	0	1	0	0.0	70	2	1	0	...	1	1	0	20	72	30	2	1	1	

```
AD
0 0.833333
1 0.163934
2 0.163934
3 0.163934
4 0.163934
```

```
[5 rows x 29 columns]
```

```
In [296]: x=train.drop('AC', axis=1)
y=train['AC']
```

```
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.25, random_state=42)
```

```
In [297]: model=GaussianNB()
model.fit(x_train, y_train)
```

```
Out[297]: GaussianNB(priors=None, var_smoothing=1e-09)
```

```
In [298]: train.replace([np.inf, -np.inf], np.nan, inplace=True)
train.fillna(999, inplace=True)
```

```

In [299]: train.fillna(-99999, inplace=True)

In [300]: def clean_dataset(train):
            assert isinstance(train, pd.DataFrame), "df needs to be a pd.DataFrame"
            train.dropna(inplace=True)
            indices_to_keep = ~train.isin([np.nan, np.inf, -np.inf]).any(1)
            return train[indices_to_keep].astype(np.float64)

In [301]: x = x.values.astype(np.float)
            y = y.values.astype(np.float)

In [302]: y_pred=model.predict(x_test)
            y_pred

Out[302]: array([1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 0, 1, 0, 0], dtype=int64)

In [303]: accuracy=accuracy_score(y_test, y_pred)*100
            accuracy

Out[303]: 72.22222222222221

```