code

October 21, 2024

[2]:
```
#Importing Necessary Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as stats
```

[4]:
```
# Binomial Distributon
# Given data
n = 10  # Number of trials
p = 0.8  # Probability of success (buying souvenir)

#1. Probability that every visitor buys a souvenir (X = 10)
prob_all_buy = stats.binom.pmf(10, n, p)
print(f"Probability that every visitor buys a souvenir: {prob_all_buy:.5f}")

#2. Probability that a maximum of 7 visitors buy souvenirs (X <= 7)
prob_max_7_buy = stats.binom.cdf(7, n, p)
print(f"Probability that a maximum of 7 visitors buy souvenirs: {prob_max_7_buy:
 ↪.5f}")
```

```
Probability that every visitor buys a souvenir: 0.10737
Probability that a maximum of 7 visitors buy souvenirs: 0.32220
```

[6]:
```
# Continuous Uniform Distribution
#Importing the dataset and displaying
debug=pd.read_csv("C:/Users/ksc14/Downloads/debug.csv")
debug.head
```

[6]:
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<bound method NDFrame.head of       Bug ID  Time Taken to fix the bug
0      12986                       2.42
1      12987                       2.03
2      12988                       2.74
3      12989                       3.21
4      12990                       3.40
…      …                        …
2093   15079                       4.17
2094   15080                       1.05
2095   15081                       2.50
```

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2096    15082                           2.85
2097    15083                           2.64

[2098 rows x 2 columns]>
```

[8]:

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# Extract debugging times (assuming the column is named 'Time')
debugging_times = debug['Time Taken to fix the bug']

# Get the minimum and maximum times for uniform distribution parameters
a = debugging_times.min()
b = debugging_times.max()

# 1. Probability that debugging takes less than 3 hours (P(X < 3))
prob_less_than_3 = stats.uniform.cdf(3, loc=a, scale=b-a)
print(f"Probability that debugging takes less than 3 hours: {prob_less_than_3:.
 ↪5f}")

# 2. Probability that debugging takes more than 2 hours (P(X > 2))
prob_more_than_2 = 1 - stats.uniform.cdf(2, loc=a, scale=b-a)
print(f"Probability that debugging takes more than 2 hours: {prob_more_than_2:.
 ↪5f}")

# 3. 50th percentile (median of debugging time)
percentile_50 = stats.uniform.ppf(0.5, loc=a, scale=b-a)
print(f"50th percentile of debugging time: {percentile_50:.5f}")
```

```
Probability that debugging takes less than 3 hours: 0.49875
Probability that debugging takes more than 2 hours: 0.75188
50th percentile of debugging time: 3.00500
```

[12]:

```
# Normal Distribution
# Loading the dataset
score = pd.read_csv("C:/Users/ksc14/Downloads/student_score.csv")
score.head()
```

[12]:

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   student_id  score
0           1   1018
1           2   1218
2           3    611
3           4    723
4           5    541
```

[14]:

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# Extract the SAT scores (assuming the column is named 'Score')
sat_scores = score['score']

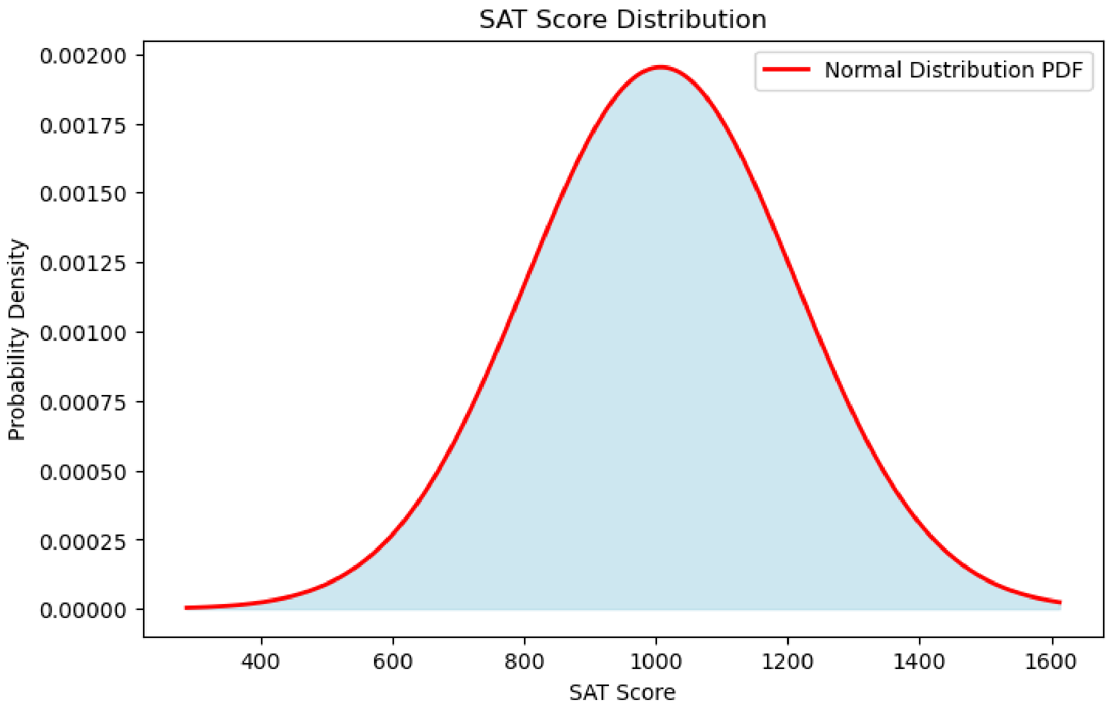
# Calculate the mean and standard deviation of SAT scores
mean_score = np.mean(sat_scores)
```

```python
std_dev = np.std(sat_scores)

# 1. Probability that a student scores less than 800
prob_less_than_800 = stats.norm.cdf(800, loc=mean_score, scale=std_dev)
print(f"Probability of scoring less than 800: {prob_less_than_800:.5f}")

# 2. Probability that a student scores more than 1300
prob_more_than_1300 = 1 - stats.norm.cdf(1300, loc=mean_score, scale=std_dev)
print(f"Probability of scoring more than 1300: {prob_more_than_1300:.5f}")

# 3. Minimum marks to secure 90th percentile
score_90th_percentile = stats.norm.ppf(0.9, loc=mean_score, scale=std_dev)
print(f"Minimum score to be in the 90th percentile: {score_90th_percentile:.
 ↪2f}")

# 4. Minimum marks to be in the top 5%
score_top_5_percent = stats.norm.ppf(0.95, loc=mean_score, scale=std_dev)
print(f"Minimum score to be in the top 5%: {score_top_5_percent:.2f}")
```

```
Probability of scoring less than 800: 0.15497
Probability of scoring more than 1300: 0.07611
Minimum score to be in the 90th percentile: 1269.31
Minimum score to be in the top 5%: 1343.54
```

[16]:

```python
# Plotting the SAT score distribution
x = np.linspace(min(sat_scores), max(sat_scores), 1000)
pdf = stats.norm.pdf(x, loc=mean_score, scale=std_dev)

plt.figure(figsize=(8, 5))
plt.plot(x, pdf, 'r-', lw=2, label='Normal Distribution PDF')
plt.fill_between(x, pdf, color='lightblue', alpha=0.6)
plt.title('SAT Score Distribution')
plt.xlabel('SAT Score')
plt.ylabel('Probability Density')
plt.legend()
plt.show()
```


SAT Score Distribution
Normal Distribution PDF
Probability Density
0.00200
0.00175
0.00150
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
400
600
800
1000
1200
1400
1600
SAT Score

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