College Event Feedback Analysis

Project Overview

This project is part of my **Data Science & Analytics Internship (Task 3)** with *Future Interns*.
The goal is to **analyze student event feedback** to uncover satisfaction trends and suggest improvements for future events.

We are working with feedback collected from **Google Forms** about various college events like workshops, seminars, and cultural activities.
The dataset contains **rating-based feedback (1–5 scale)** and optional **text-based comments**.

bold text

Project Objectives

1. **Clean & Prepare Data** for analysis.
2. **Analyze Ratings** to find strengths and weaknesses.
3. **Perform Sentiment Analysis** on comments.
4. **Visualize Insights** with clear and attractive charts.
5. **Recommend Improvements** based on findings.

Deliverables

- Cleaned datasets (`student_feedback_cleaned.csv` , `student_satisfaction_cleaned.csv`)
- Visual charts and graphs (saved as PNG files)
- PDF Report with analysis & insights
- GitHub repository with code, datasets, and results

Libraries Used

- **numpy** → Numerical operations and mathematical calculations.
- **pandas** → Data manipulation, cleaning, and analysis.
- **matplotlib.pyplot** → Creating basic plots and visualizations.
- **seaborn** → Advanced statistical visualizations with better styling.
- **sklearn.preprocessing.LabelEncoder** → Converting categorical data into numerical form for analysis.
- **wordcloud** → Generating a visual word cloud from text data to highlight frequent words.
- **STOPWORDS** → Predefined list of common words (like "the", "and") to exclude from the word cloud.

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import LabelEncoder
from wordcloud import WordCloud, STOPWORDS
```

Data Cleaning Steps

1. **Checked Dataset Shape**
   - Used `.shape` to see the number of rows and columns.
2. **Renamed Columns**
   - Renamed long column names into short, meaningful labels for easier analysis.
   - Example: `"Well versed with the subject"` → `"Subject_Knowledge"`.
3. **Checked for Missing Values**
   - Used `.isnull().sum()` to find any null values.
   - Decided how to handle them (e.g., fill or drop).
4. **Checked for Duplicate Records**

- Used `.duplicated().sum()` to identify duplicates.
- Removed duplicates using `.drop_duplicates()`.

5. **Label Encoding for Categorical Columns**
   - Applied `LabelEncoder` from `sklearn` to convert text categories into numeric codes for analysis.

After cleaning, the dataset became **more structured, readable, and ready** for visualization and analysis.

```
feedback= pd.read_csv(r"C:\Users\Vikas\Desktop\FUTURE_DS_03\Dataset\student_feedback.csv")
Statisfaction = pd.read_csv(r"C:\Users\Vikas\Desktop\FUTURE_DS_03\Dataset\Student_Satisfaction_Survey.csv",encoding="ISO-88
```

```
feedback.rename(columns={
    "Unnamed: 0": "ID",
    "Student ID": "Student_ID",
    "Well versed with the subject": "Subject_Knowledge",
    "Explains concepts in an understandable way": "Concept_Clarity",
    "Use of presentations": "Presentations",
    "Degree of difficulty of assignments": "Assignment_Difficulty",
    "Solves doubts willingly": "Doubt_Solving",
    "Structuring of the course": "Course_Structure",
    "Provides support for students going above and beyond": "Extra_Support",
    "Course recommendation based on relevance": "Course_Recommendation"
}, inplace=True)
```

```
feedback.head(3)
```

	ID	Student_ID	Subject_Knowledge	Concept_Clarity	Presentations	Assignment_Difficulty	Doubt_Solving	Course_Stru
0	0	340	5	2	7	6	9	
1	1	253	6	5	8	6	2	
2	2	680	7	7	6	5	4	

```
feedback.shape
```

```
(1001, 10)
```

```
feedback.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1001 entries, 0 to 1000
Data columns (total 10 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   ID                     1001 non-null   int64
 1   Student_ID             1001 non-null   int64
 2   Subject_Knowledge      1001 non-null   int64
 3   Concept_Clarity        1001 non-null   int64
 4   Presentations          1001 non-null   int64
 5   Assignment_Difficulty  1001 non-null   int64
 6   Doubt_Solving          1001 non-null   int64
 7   Course_Structure       1001 non-null   int64
 8   Extra_Support          1001 non-null   int64
 9   Course_Recommendation  1001 non-null   int64
dtypes: int64(10)
memory usage: 78.3 KB
```

```
feedback.isnull().sum()
```

```
ID                     0
Student_ID             0
Subject_Knowledge      0
```

```
Concept_Clarity          0
Presentations            0
Assignment_Difficulty    0
Doubt_Solving            0
Course_Structure         0
Extra_Support            0
Course_Recommendation    0
dtype: int64
```

```
# Check for duplicate values
feedback.duplicated().sum()
```

```
np.int64(0)
```

Cleaning the Student Satisfaction Survery data

```
Statisfaction.head(3)
```

	SN	Total Feedback Given	Total Configured	Questions	Weightage 1	Weightage 2	Weightage 3	Weightage 4	Weightage 5	Average/ Percentage	Course N
0	1	1	12	How much of the syllabus was covered in the cl...	0	0	1	0	0	3.00 / 60.00	FY B.V FO TECHNOLO
1	2	1	12	How well did the teachers prepare for the clas...	0	0	0	0	1	5.00 / 100.00	FY B.V FO TECHNOLO
				How well were							FY B.V

```
Statisfaction.rename(columns={
    'SN': 'SN',
    'Total Feedback Given': 'Feedback',
```

```
    'Total Configured': 'Configured',
    'Questions': 'Ques',
    'Weightage 1': 'W1',
    'Weightage 2': 'W2',
    'Weightage 3': 'W3',
    'Weightage 4': 'W4',
    'Weightage 5': 'W5',
    'Average/ Percentage': 'Avg%',
    'Course Name': 'Course',
    'Basic Course': 'Basic'
}, inplace=True)
```

```
Statisfaction.shape
```

```
(580, 12)
```

```
Statisfaction.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 580 entries, 0 to 579
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   SN            580 non-null    int64 
 1   Feedback      580 non-null    int64 
 2   Configured    580 non-null    int64 
 3   Ques          580 non-null    object
 4   W1            580 non-null    int64 
 5   W2            580 non-null    int64 
 6   W3            580 non-null    int64 
 7   W4            580 non-null    int64 
 8   W5            580 non-null    int64 
 9   Avg%          580 non-null    object
 10  Course Name   580 non-null    object
 11  Basic         580 non-null    object
dtypes: int64(8), object(4)
memory usage: 54.5+ KB
```

```
Statisfaction.isnull().sum()
```

```
SN              0
Feedback        0
Configured      0
Ques            0
W1              0
W2              0
W3              0
W4              0
W5              0
Avg%            0
Course Name     0
Basic           0
dtype: int64
```

```
# Check for duplicate values
Statisfaction.duplicated().sum()
```

```
np.int64(0)
```

```
Statisfaction["Course Name "].unique()
```

```
array(['FY B.VOC FOOD TECHNOLOGY', 'FYBA',
       'FY BCOM (ACCOUNTING & FINANCE)', 'FY BCOM (BANKING & INSURANCE)',
       'FYBMS ', 'FYBSC', 'MA PSYCHOLOGY - 1', 'MA PSYCHOLOGY - 3',
       'M.SC PART - 1 COMPUTER SCIENCE', 'MSC ANALYTICAL CHEMISTRY SEM I',
       'MSC DATA SCIENCE - 1', 'MSC INFORMATION TECHNOLOGY - 1',
       'MSC MICROBIOLOGY - 1', 'MSC ANALYTICAL CHEMISTRY SEM III',
       'M.SC PART - 2 COMPUTER SCIENCE', 'MSC DATA SCIENCE - 3',
       'MSC INFORMATION TECHNOLOGY - 3', 'MSC MICROBIOLOGY - 3',
       'MSC ORGANIC CHEMISTRY - 3', 'MSC PHYSICS - 3', 'S.Y.B.A.F',
       'SYBCOM', 'SYBMS ', 'SYBSC', 'SY COMPUTER SCIENCE', 'TYBA',
       'TYBCOM', 'TYBMS ', 'TYBSC '], dtype=object)
```

```
le = LabelEncoder()
Statisfaction['Course_Code'] = le.fit_transform(Statisfaction['Course Name '])
Statisfaction[['Course Name ', 'Course_Code']].head(3)
```

	Course Name	Course_Code
0	FY B.VOC FOOD TECHNOLOGY	0
1	FY B.VOC FOOD TECHNOLOGY	0
2	FY B.VOC FOOD TECHNOLOGY	0

```
Statisfaction["Basic"].unique()
```

```
array(['B.VOC FOOD TECHNOLOGY', 'BACHELOR OF ARTS',
       'BACHELOR OF COMMERCE (ACCOUNTING AND FINANCE)',
       'BACHELOR OF COMMERCE (BANKING AND INSURANCE)',
       'BACHELOR OF MANAGEMENT STUDIES', 'BACHELOR OF SCIENCE',
       'MA PSYCHOLOGY', 'MSC COMPUTER SCIENCE',
       'MSC ANALYTICAL CHEMISTRY', 'MSC DATA SCIENCE',
       'MSC INFORMATION TECHNOLOGY', 'MSC MICROBIOLOGY',
       'MSC ORGANIC CHEMISTRY', 'MSC PHYSICS', 'BACHELOR OF COMMERCE',
       'B.SC. COMPUTER SCIENCE'], dtype=object)
```

```
Statisfaction['Basic_InCode'] = le.fit_transform(Statisfaction['Basic'])
Statisfaction[['Basic', 'Basic_InCode']].head(3)
```

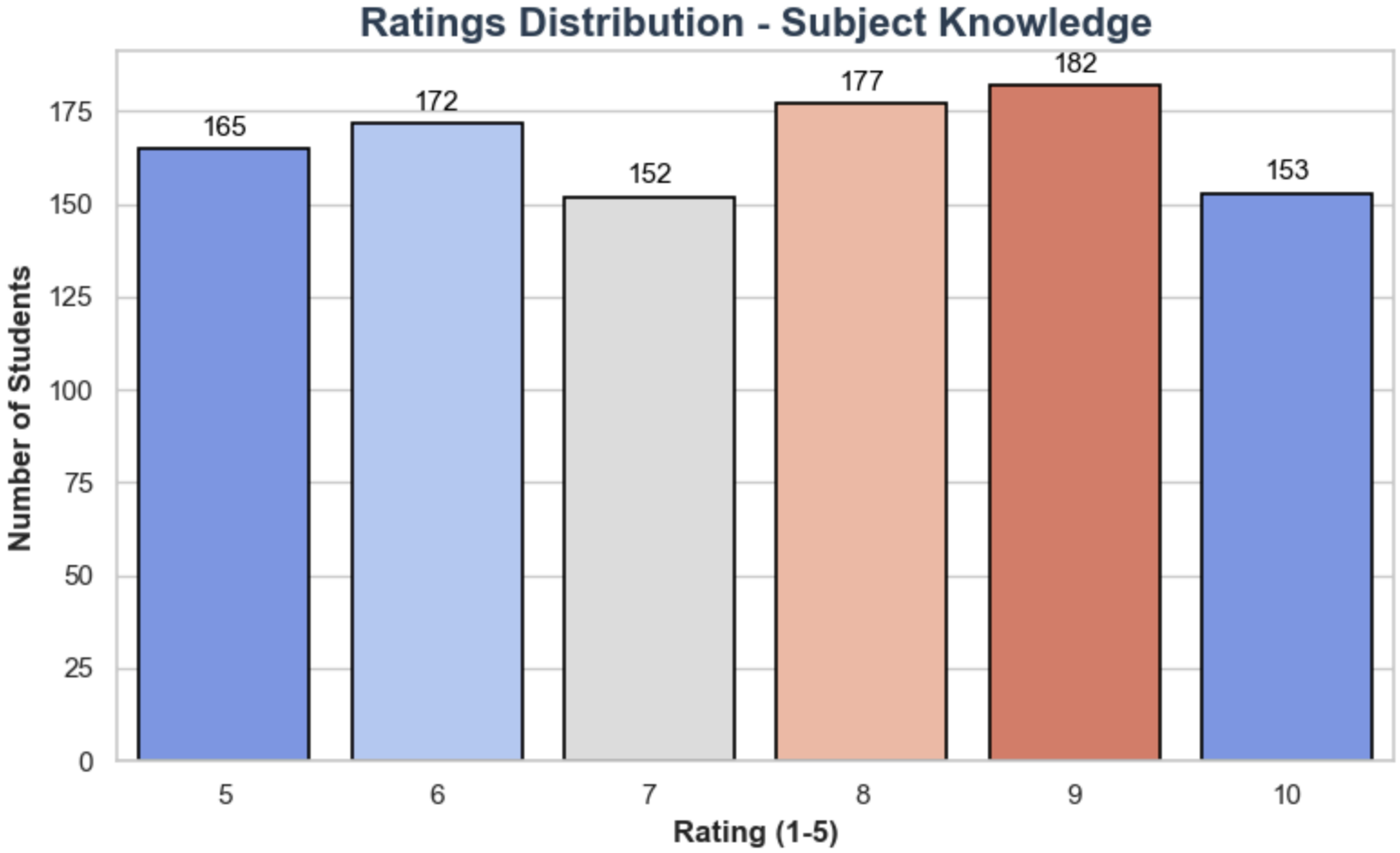
	Basic	Basic_InCode
0	B.VOC FOOD TECHNOLOGY	1
1	B.VOC FOOD TECHNOLOGY	1
2	B.VOC FOOD TECHNOLOGY	1

Charts & Visualizations on Feedback Dataset

Ratings Distribution Chart

```
sns.set_theme(style="whitegrid")
question_col = "Subject_Knowledge"
plt.figure(figsize=(8,5))
colors = sns.color_palette("coolwarm", 5)  # For ratings 1–5
sns.countplot(
    x=question_col,
    data=feedback,
    palette=colors,
    edgecolor='black',
    linewidth=1.2
)
plt.title(f"Ratings Distribution - {question_col.replace('_', ' ')}", fontsize=16, fontweight='bold', color="#2E4053")
plt.xlabel("Rating (1-5)", fontsize=12, fontweight='bold')
plt.ylabel("Number of Students", fontsize=12, fontweight='bold')
for p in plt.gca().patches:
    plt.gca().annotate(
        f'{int(p.get_height())}',
        (p.get_x() + p.get_width() / 2., p.get_height()),
        ha='center', va='center', fontsize=11, color='black', xytext=(0, 8),
        textcoords='offset points'
    )
plt.tight_layout()
plt.show()
```

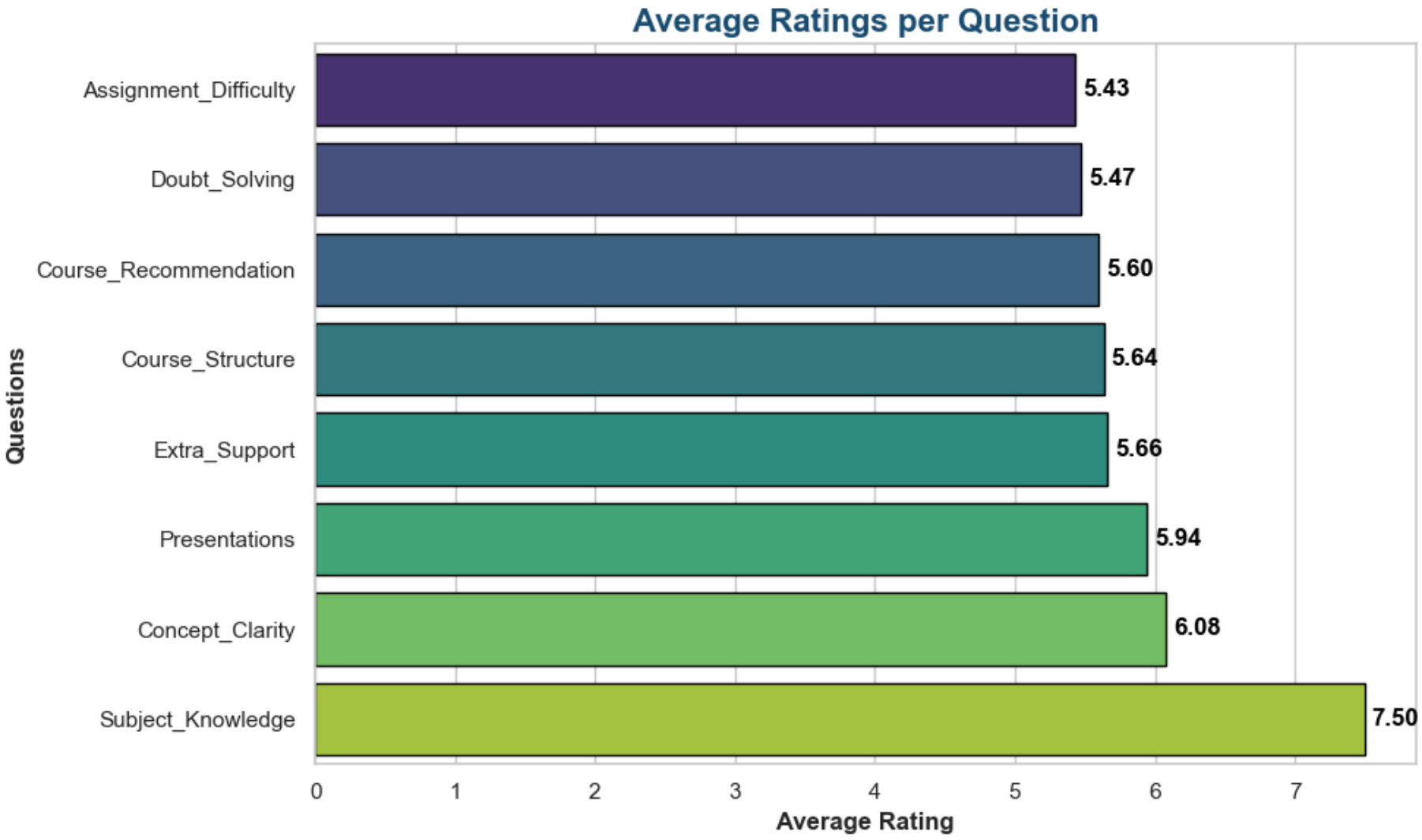
```
C:\Users\Vikas\AppData\Local\Temp\ipykernel_6688\2969416608.py:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue

  sns.countplot(
C:\Users\Vikas\AppData\Local\Temp\ipykernel_6688\2969416608.py:5: UserWarning:
The palette list has fewer values (5) than needed (6) and will cycle, which may produce an uninterpretable plot.
  sns.countplot(
```



Average Ratings per Question

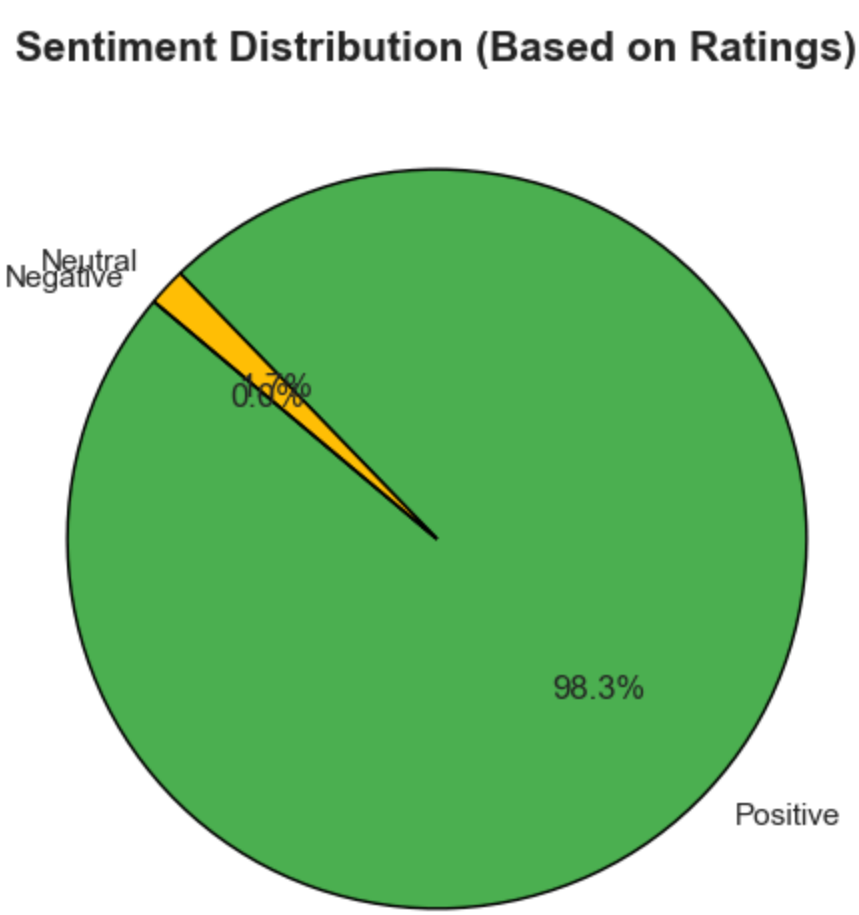
```
# Select only rating columns
rating_cols = [
    "Subject_Knowledge",
    "Concept_Clarity",
    "Presentations",
    "Assignment_Difficulty",
    "Doubt_Solving",
    "Course_Structure",
    "Extra_Support",
    "Course_Recommendation"
]

# Calculate average rating for each question
avg_ratings = feedback[rating_cols].mean().sort_values()

plt.figure(figsize=(10,6))
sns.barplot(
    x=avg_ratings.values,
    y=avg_ratings.index,
    palette="viridis",
    edgecolor="black"
)

plt.title("Average Ratings per Question", fontsize=16, fontweight='bold', color="#1B4F72")
plt.xlabel("Average Rating", fontsize=12, fontweight='bold')
plt.ylabel("Questions", fontsize=12, fontweight='bold')

# Add value labels
for i, v in enumerate(avg_ratings.values):
    plt.text(v + 0.05, i, f"{v:.2f}", color='black', va='center', fontweight='bold')

plt.tight_layout()
plt.show()
```

```
C:\Users\Vikas\AppData\Local\Temp\ipykernel_6688\901857327.py:17: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `y` variable to `hue

  sns.barplot(
```



Average Rating

```
for col in rating_cols:
    feedback[col] = pd.to_numeric(feedback[col], errors='coerce')

feedback["Avg_Rating"] = feedback[rating_cols].mean(axis=1)

feedback["Sentiment"] = pd.cut(
    feedback["Avg_Rating"],
    bins=[-1, 2.5, 3.5, 5.1],  # adjust boundaries if needed
    labels=["Negative", "Neutral", "Positive"]
)

sentiment_counts = feedback["Sentiment"].value_counts().reindex(["Positive", "Neutral", "Negative"]).fillna(0)

sns.set_theme(style="whitegrid")

# Create pie chart
plt.figure(figsize=(6, 6))
colors = ["#4CAF50", "#FFC107", "#F44336"]  # green, yellow, red
plt.pie(
    sentiment_counts,
    labels=sentiment_counts.index,
    autopct='%1.1f%%',
    startangle=140,
    colors=colors,
    wedgeprops={'edgecolor': 'black'}
)
plt.title("Sentiment Distribution (Based on Ratings)", fontsize=15, fontweight="bold")
plt.show()
```

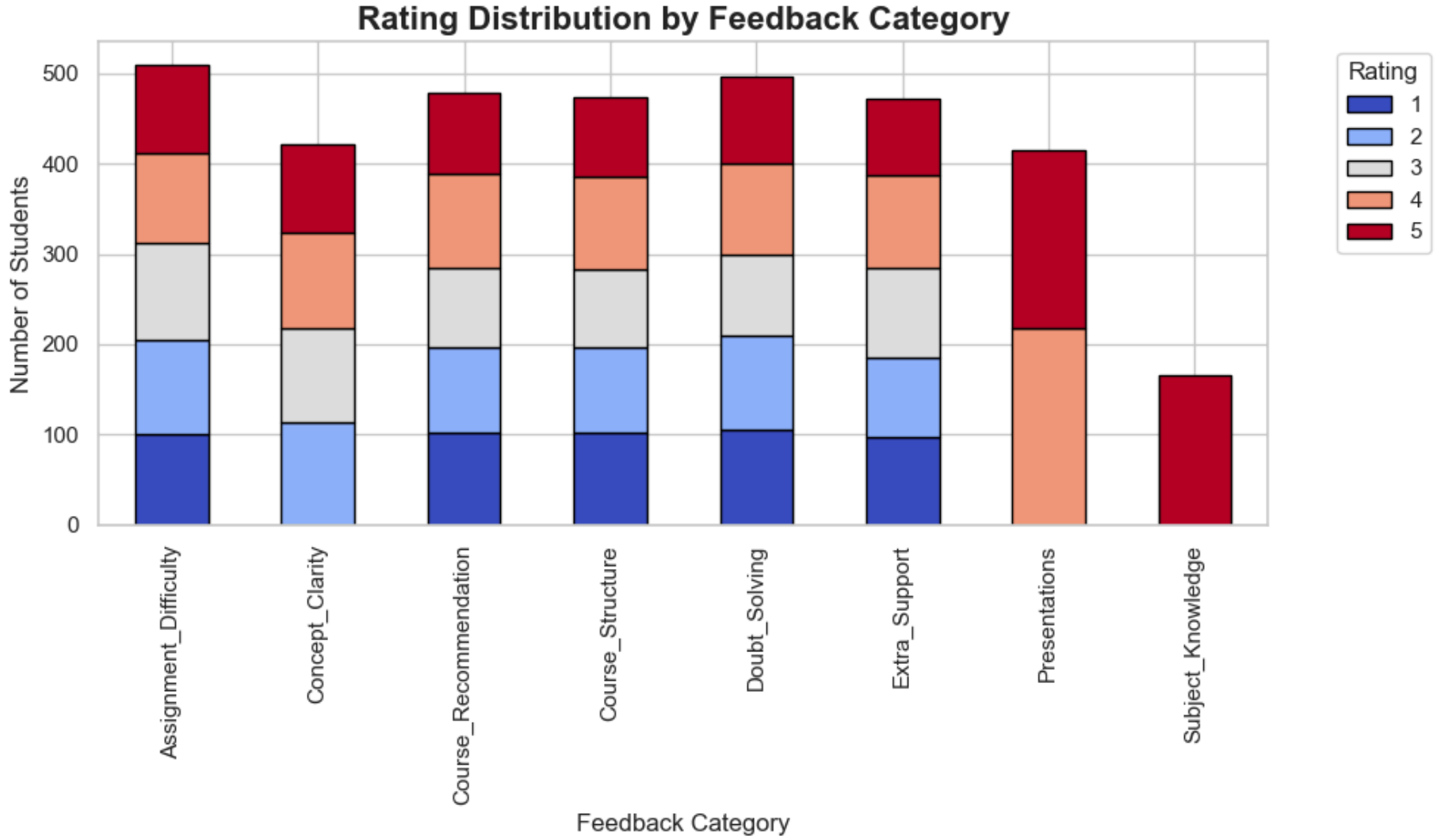


Rating Distribution by Feedback Category

```
for col in rating_cols:
    feedback[col] = pd.to_numeric(feedback[col], errors='coerce')
feedback_melted = feedback.melt(value_vars=rating_cols, var_name="Category", value_name="Rating")
rating_distribution = feedback_melted.groupby(["Category", "Rating"]).size().reset_index(name="Count")
```

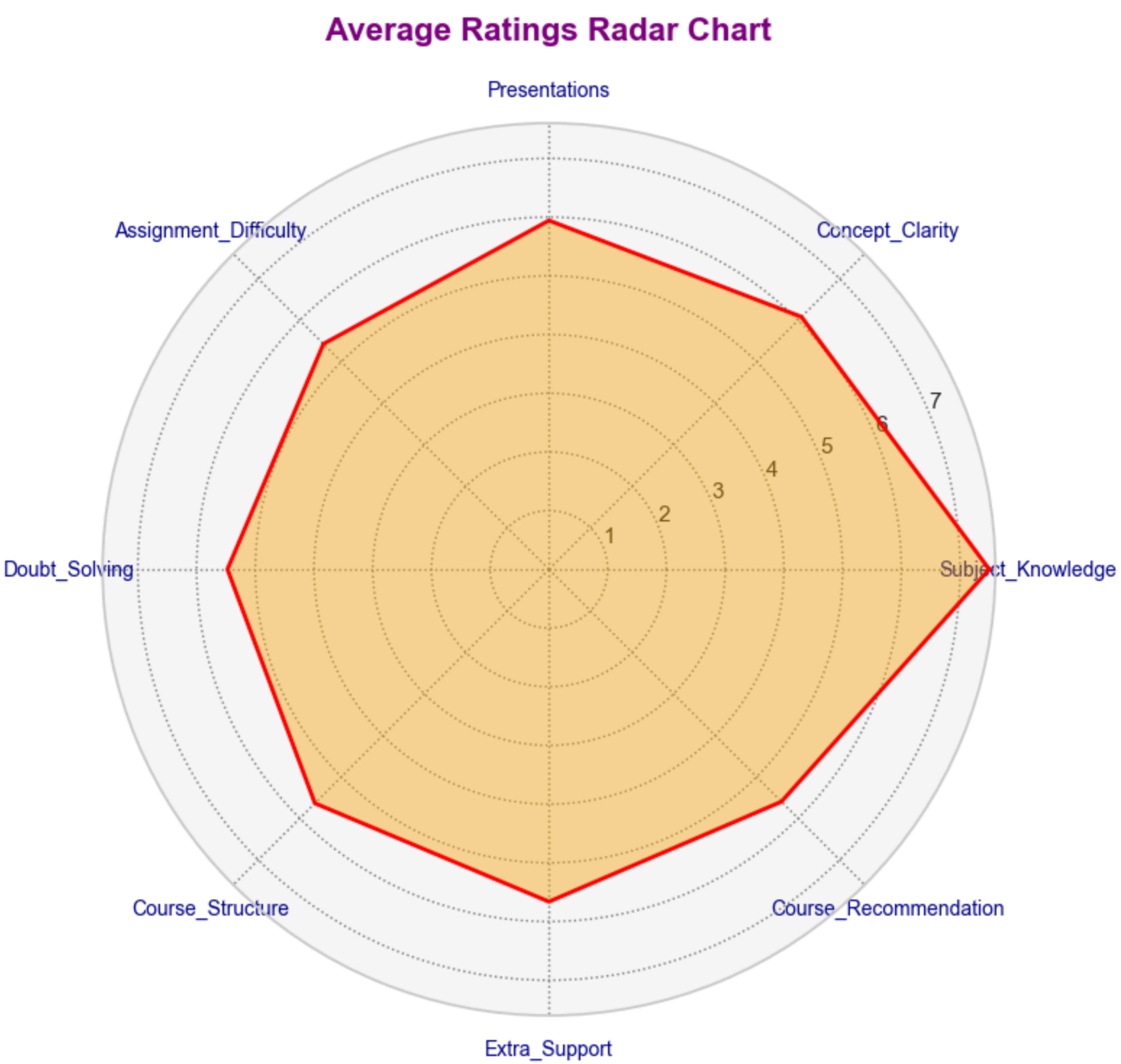
```
    plt.figure(figsize=(10, 6))
    sns.set_theme(style="whitegrid")

    rating_pivot = rating_distribution.pivot(index="Category", columns="Rating", values="Count").fillna(0)
    rating_pivot = rating_pivot[[1, 2, 3, 4, 5]]

    rating_pivot.plot(
        kind="bar",
        stacked=True,
        figsize=(10, 6),
        colormap="coolwarm",
        edgecolor="black"
    )

    plt.title("Rating Distribution by Feedback Category", fontsize=16, fontweight="bold")
    plt.xlabel("Feedback Category", fontsize=12)
    plt.ylabel("Number of Students", fontsize=12)
    plt.legend(title="Rating", bbox_to_anchor=(1.05, 1), loc='upper left')
    plt.tight_layout()
    plt.show()
```

```
<Figure size 1000x600 with 0 Axes>
```



Average rating chart

```
avg_scores = feedback[rating_cols].mean()
num_vars = len(rating_cols)

angles = np.linspace(0, 2 * np.pi, num_vars, endpoint=False).tolist()
avg_scores = avg_scores.tolist()
avg_scores += avg_scores[:1]
angles += angles[:1]

plt.figure(figsize=(8, 8))
ax = plt.subplot(111, polar=True)


plt.xticks(angles[:-1], rating_cols, color='darkblue', fontsize=10)

ax.plot(angles, avg_scores, color="red", linewidth=2, linestyle='solid')
ax.fill(angles, avg_scores, color="orange", alpha=0.4)


ax.set_facecolor("#f5f5f5")
ax.grid(color="gray", linestyle="dotted")
plt.title("Average Ratings Radar Chart", fontsize=16, fontweight="bold", color="purple", pad=20)

plt.show()
```


Average Ratings Radar Chart
Presentations
Concept_Clarity
Subject_Knowledge
Course_Recommendation
Extra_Support
Course_Structure
Doubt_Solving
Assignment_Difficulty
1
2
3
4
5
6
7

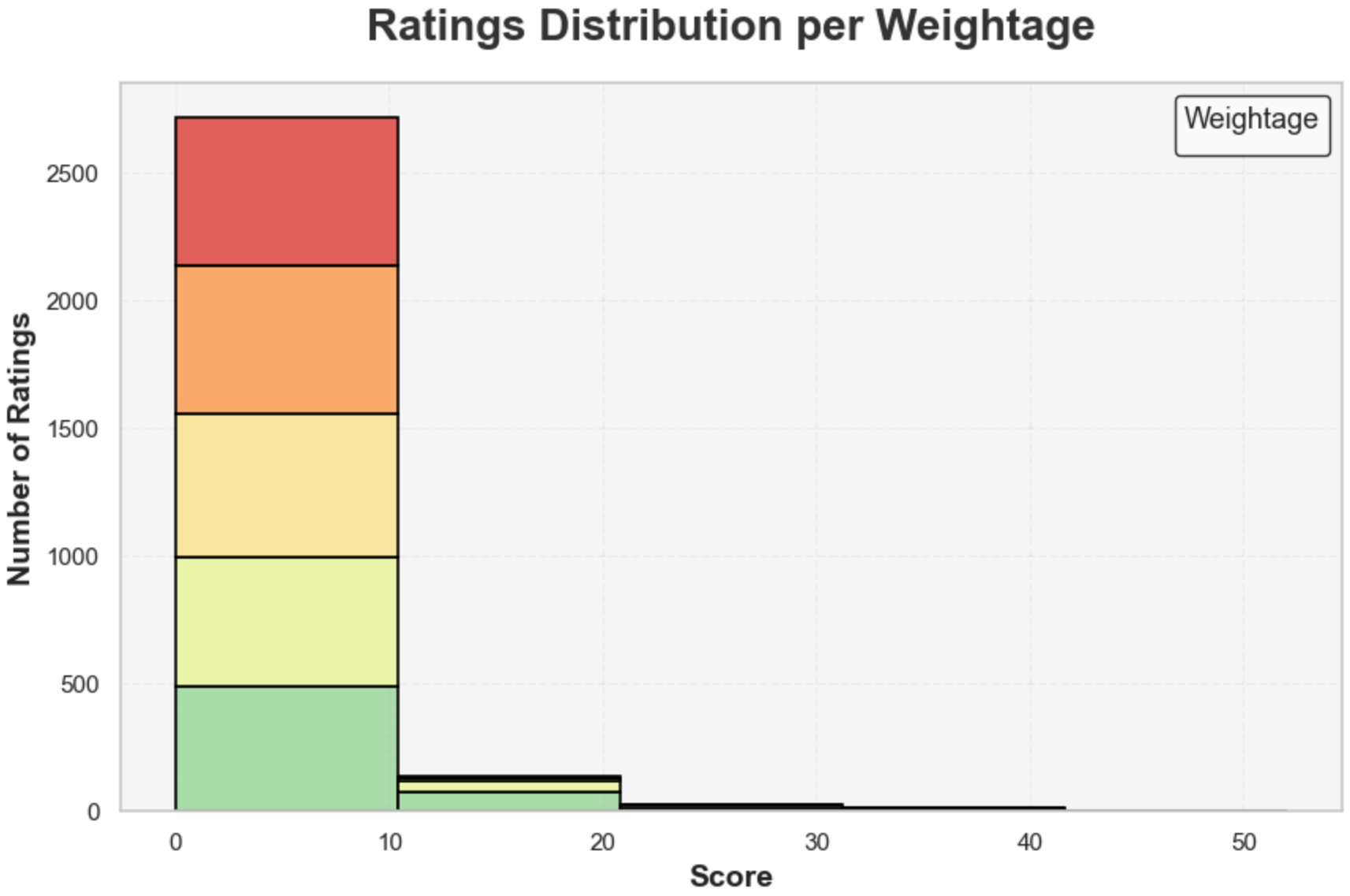
Charts & Visualizations on Student Satisfaction Dataset

Attractive Chart – Ratings Distribution

```
sns.set_style("whitegrid")
sns.set_palette("Spectral")  # colorful palette

rating_cols = ["W1", "W2", "W3", "W4", "W5"]
ratings_melted = Statisfaction.melt(value_vars=rating_cols, var_name="Weightage", value_name="Score")

plt.figure(figsize=(10,6))
ax = sns.histplot(data=ratings_melted,
                  x="Score",
                  hue="Weightage",
                  multiple="stack",
                  bins=5,
                  edgecolor="black",
                  linewidth=1.2,
                  alpha=0.9)

# Titles and labels
plt.title("Ratings Distribution per Weightage", fontsize=20, fontweight="bold", color="#333333", pad=20)
plt.xlabel("Score", fontsize=14, fontweight="bold")
plt.ylabel("Number of Ratings", fontsize=14, fontweight="bold")

# Style legend
plt.legend(title="Weightage", title_fontsize=13, fontsize=11, frameon=True, edgecolor="black")

# Grid and background
ax.set_facecolor("#f9f9f9")
plt.grid(alpha=0.3, linestyle="--")
```

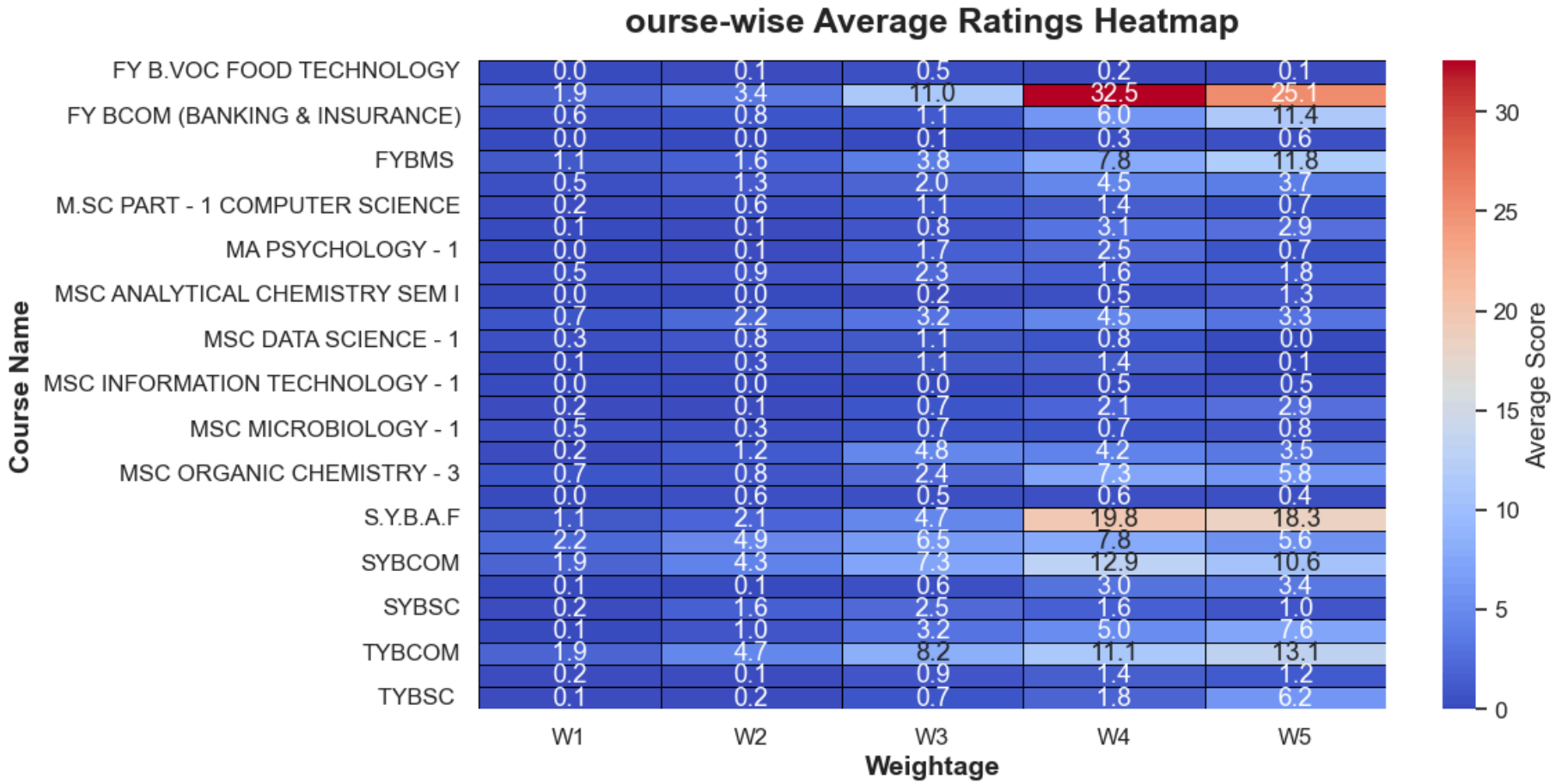
```
plt.show()
```

```
C:\Users\Vikas\AppData\Local\Temp\ipykernel_6688\1987102382.py:23: UserWarning: No artists with labels found to put in
  plt.legend(title="Weightage", title_fontsize=13, fontsize=11, frameon=True, edgecolor="black")
```



Average % by Course chart

```
rating_cols = ["W1", "W2", "W3", "W4", "W5"]
Statisfaction[rating_cols] = Statisfaction[rating_cols].apply(pd.to_numeric, errors="coerce")

heatmap_data = Statisfaction.groupby("Course Name ")[rating_cols].mean()


plt.figure(figsize=(12, 6))
sns.set(font_scale=1.1)
ax = sns.heatmap(
    heatmap_data,
    annot=True, fmt=".1f",
    cmap="coolwarm",
    cbar_kws={'label': 'Average Score'},
    linewidths=0.5,
    linecolor="black"
)

plt.title("ourse-wise Average Ratings Heatmap", fontsize=18, fontweight="bold", pad=15)
plt.xlabel("Weightage", fontsize=14, fontweight="bold")
plt.ylabel("Course Name", fontsize=14, fontweight="bold")
plt.tight_layout()
plt.show()
```

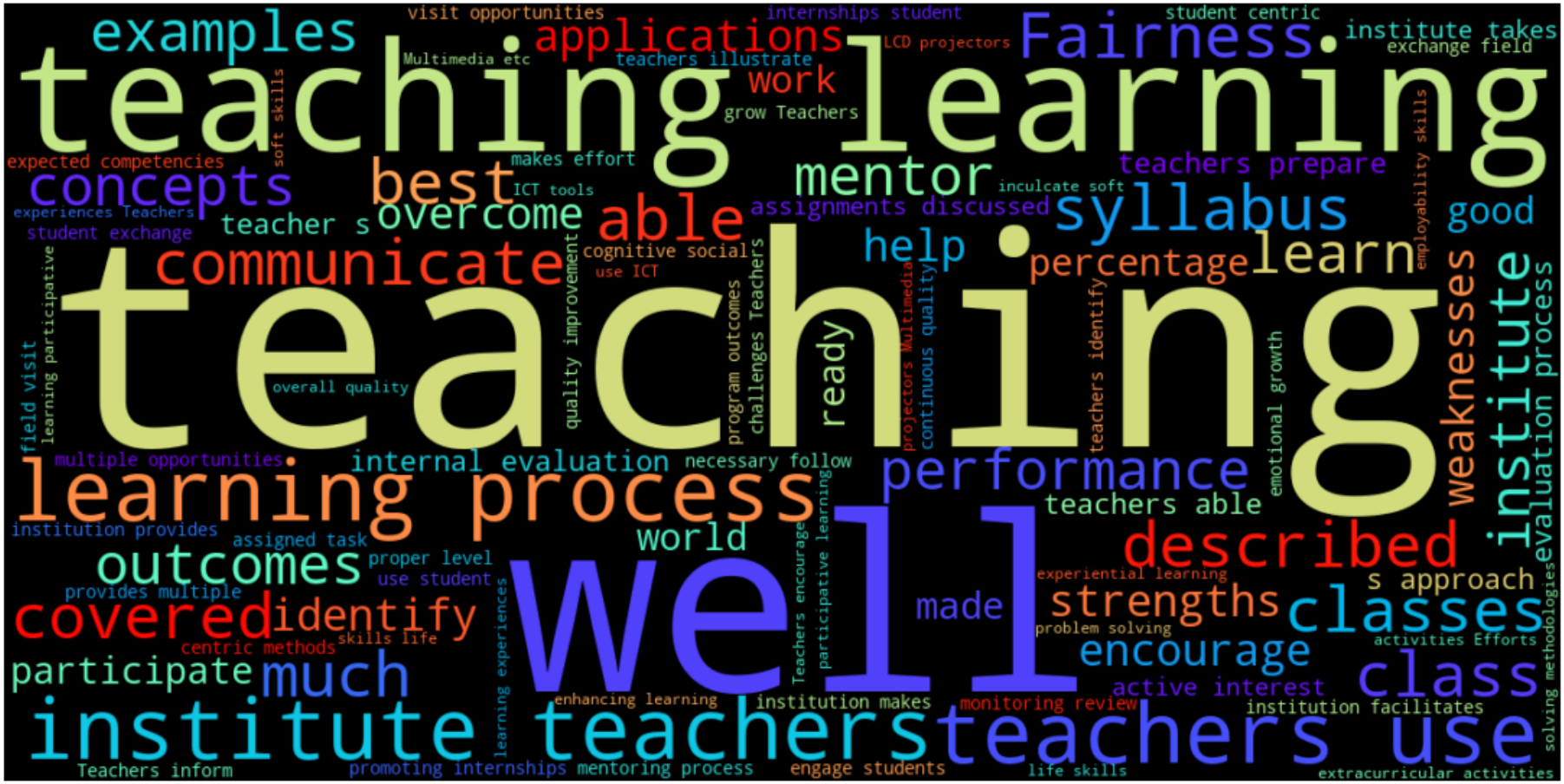


Student Satisfaction Insights – Word Cloud

```
text_columns = ["Feedback", "Configured", "Ques"]
```

```
# Flatten all text into a single list
all_text_list = []
for col in text_columns:
    all_text_list.extend(Statisfaction[col].dropna().astype(str).tolist())

# Join into one big string
text_data = " ".join(all_text_list)

# Extra stopwords
stopwords = set(STOPWORDS)
stopwords.update(["nan", "None", "Course", "Feedback"])

# Create word cloud
wordcloud = WordCloud(
    width=1200,
    height=600,
    background_color="black",
    colormap="rainbow",
    contour_color="white",
    contour_width=2,
    stopwords=stopwords,
    max_words=300
).generate(text_data)

# Plot
plt.figure(figsize=(14, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis("off")
plt.title("💭 Word Cloud from Student Feedback", fontsize=20, fontweight="bold", pad=20, color="white")
plt.show()
```

```
C:\Users\Vikas\AppData\Roaming\Python\Python313\site-packages\IPython\core\pylabtools.py:170: UserWarning: Glyph 128173
  fig.canvas.print_figure(bytes_io, **kw)
```




```
# Columns for ratings
```

```
    rating_cols = ["W1", "W2", "W3", "W4", "W5"]

    # Get average ratings per course
    course_ratings = Statisfaction.groupby("Course Name ")[rating_cols].mean()

    # Number of variables
    num_vars = len(rating_cols)

    # Angles for radar chart
```