STUDENT FEEDBACK SENTIMENT ANALYSIS

```
import zipfile
import os

zip_path = "archive (11).zip"
extract_path = "student_feedback_data"

with zipfile.ZipFile(zip_path, 'r') as zip_ref:
    zip_ref.extractall(extract_path)

os.listdir(extract_path)
```

```
['finalDataset0.2.xlsx']
```

```
import pandas as pd

df = pd.read_excel("student_feedback_data/finalDataset0.2.xlsx")

df.head()
```

	teaching	teaching.1	coursecontent	coursecontent.1	examination	Examinat
0	0	teacher are punctual but they should also give...	0.0	content of courses are average	1.0	examina patter g
1	1	Good	-1.0	Not good	1.0	G
2	1	Excellent lectures are delivered by teachers a...	1.0	All courses material provide very good knowled...	1.0	Exam pat is up to mark and Cgpa c
3	1	Good	-1.0	Content of course is perfectly in line with th...	-1.0	Again univer t student their
4	1	teachers give us all the information required ...	1.0	content of courses improves my knowledge	1.0	examina patter g

Next steps: Generate code with df New interactive sheet

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 185 entries, 0 to 184
Data columns (total 12 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   teaching             185 non-null    int64
 1   teaching.1           185 non-null    object
 2   coursecontent        184 non-null    float64
 3   coursecontent.1      185 non-null    object
 4   examination          184 non-null    float64
 5   Examination          185 non-null    object
 6   labwork              185 non-null    int64
 7   labwork.1            185 non-null    object
 8   library_facilities   182 non-null    float64
 9    library_facilities  185 non-null    object
 10  extracurricular      185 non-null    int64
 11  extracurricular.1    185 non-null    object
dtypes: float64(3), int64(3), object(6)
memory usage: 17.5+ KB
```

```
df = df.rename(columns={
    'teaching': 'teaching_score',
    'teaching.1': 'teaching_text',
    'coursecontent': 'coursecontent_score',
    'coursecontent.1': 'coursecontent_text',
    'examination': 'examination_score',
    'Examination': 'examination_text',
    'labwork': 'labwork_score',
    'labwork.1': 'labwork_text',
    'library_facilities': 'library_score',
    ' library_facilities': 'library_text', # Corrected: target column with lea
    'extracurricular': 'extracurricular_score',
    'extracurricular.1': 'extracurricular_text'
})

df.head()
```

	teaching_score	teaching_text	coursecontent_score	coursecontent_text	exa
0	0	teacher are punctual but they should also give...	0.0	content of courses are average	
1	1	Good	-1.0	Not good	
2	1	Excellent lectures are delivered by	1.0	All courses material provide very good	
3	1	Good	-1.0	perfectly in line with th...	
4	1	teachers give us all the information required ...	1.0	content of courses improves my knowledge	

```
df.isnull().sum()
```

	0
teaching_score	0
teaching_text	0
coursecontent_score	1
coursecontent_text	0
examination_score	1
examination_text	0
labwork_score	0
labwork_text	0
library_score	3
library_facilities	0
extracurricular_score	0
extracurricular_text	0

dtype: int64

Next steps: Generate code with df New interactive sheet

```
# Fill missing numeric scores with column mean
score_cols = [
    'teaching_score',
    'coursecontent_score',
    'examination_score',
    'labwork_score',
    'library_score',
    'extracurricular_score'
]

for col in score_cols:
    df[col].fillna(df[col].mean(), inplace=True)

df.isnull().sum()
```

```
/tmp/ipython-input-2972224844.py:12: FutureWarning: A value is trying to be se
The behavior will change in pandas 3.0. This inplace method will never work be

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.m


  df[col].fillna(df[col].mean(), inplace=True)
```

	0
teaching_score	0
teaching_text	0
coursecontent_score	0
coursecontent_text	0
examination_score	0
examination_text	0
labwork_score	0
labwork_text	0
library_score	0
library_facilities	0
extracurricular_score	0
extracurricular_text	0

dtype: int64

```
df['overall_score'] = df[score_cols].mean(axis=1)
df[['overall_score']].head()
```

	overall_score
0	0.166667
1	0.333333
2	1.000000
3	-0.166667
4	1.000000

```
def label_sentiment(score):
    if score >= 4:
        return 'Positive'
    elif score <= 2:
        return 'Negative'
    else:
        return 'Neutral'
```

```
df['sentiment_label'] = df['overall_score'].apply(label_sentiment)
df['sentiment_label'].value_counts()
```

sentiment_label	count
Negative	185

dtype: int64

```
!pip install textblob vaderSentiment wordcloud
```

```
Requirement already satisfied: textblob in /usr/local/lib/python3.12/dist-pack
Collecting vaderSentiment
  Downloading vaderSentiment-3.3.2-py2.py3-none-any.whl.metadata (572 bytes)
Requirement already satisfied: wordcloud in /usr/local/lib/python3.12/dist-pac
Requirement already satisfied: nltk>=3.9 in /usr/local/lib/python3.12/dist-pac
Requirement already satisfied: requests in /usr/local/lib/python3.12/dist-pack
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib/python3.12/dist-
Requirement already satisfied: pillow in /usr/local/lib/python3.12/dist-packag
Requirement already satisfied: matplotlib in /usr/local/lib/python3.12/dist-pa
Requirement already satisfied: click in /usr/local/lib/python3.12/dist-package
Requirement already satisfied: joblib in /usr/local/lib/python3.12/dist-packag
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.12/di
Requirement already satisfied: tqdm in /usr/local/lib/python3.12/dist-packages
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.12/d
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.12/dist-
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.12/
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.12/
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.12/di
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.12/d
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.
Requirement already satisfied: charset_normalizer<4,>=2 in /usr/local/lib/pyth
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.12/dist-
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.12
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.12
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.12/dist-pack
Downloading vaderSentiment-3.3.2-py2.py3-none-any.whl (125 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 126.0/126.0 kB 9.5 MB/s eta 0:00:0
Installing collected packages: vaderSentiment
Successfully installed vaderSentiment-3.3.2
```

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

from textblob import TextBlob
from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer
from wordcloud import WordCloud
```

```
text_cols = [
    'teaching_text',
    'coursecontent_text',
    'examination_text',
    'labwork_text',
    'library_text', # Updated column name after renaming
    'extracurricular_text'
]

df['combined_text'] = df[text_cols].astype(str).agg(' '.join, axis=1)
```

```
df['combined_text'] = df[text_cols].astype(str).agg(' '.join, axis=1)
df['textblob_polarity'] = df['combined_text'].apply(
    lambda x: TextBlob(x).sentiment.polarity
)
```

```
analyzer = SentimentIntensityAnalyzer()

df['vader_compound'] = df['combined_text'].apply(
    lambda x: analyzer.polarity_scores(x)['compound']
)
```

```
def vader_label(score):
    if score >= 0.05:
        return 'Positive'
    elif score <= -0.05:
        return 'Negative'
    else:
        return 'Neutral'

df['text_sentiment'] = df['vader_compound'].apply(vader_label)
df['text_sentiment'].value_counts()
```

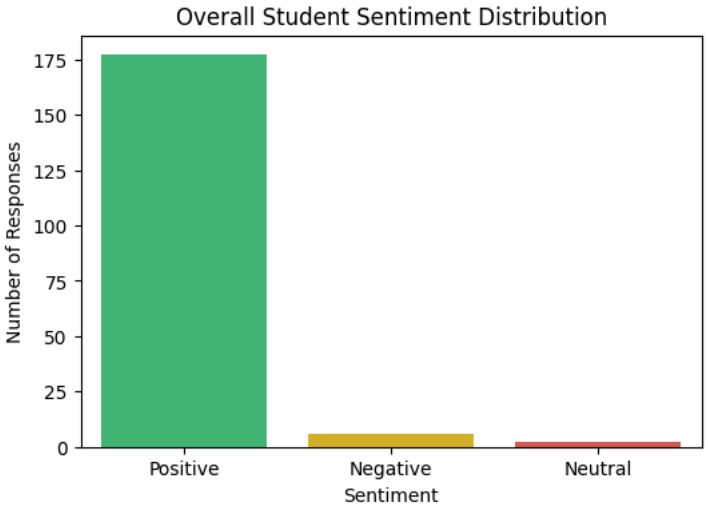
text_sentiment	count
Positive	177
Negative	6
Neutral	2

dtype: int64

```
plt.figure(figsize=(6,4))
sns.countplot(
    x='text_sentiment',
    data=df,
    palette=['#2ecc71', '#f1c40f', '#e74c3c']
)
```

```
plt.title('Overall Student Sentiment Distribution')
plt.xlabel('Sentiment')
plt.ylabel('Number of Responses')
plt.show()
```

```
/tmp/ipython-input-2164077719.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in

  sns.countplot(
```




```
df['library_sentiment'] = df[' library_facilities'].apply(
    lambda x: analyzer.polarity_scores(str(x))['compound']
)

df['library_sentiment_label'] = df['library_sentiment'].apply(vader_label)
df['library_sentiment_label'].value_counts()
```

library_sentiment_label	count
Positive	140
Neutral	35
Negative	10

dtype: int64

```
positive_text = ' '.join(
    df[df['text_sentiment'] == 'Positive']['combined_text']
)
```

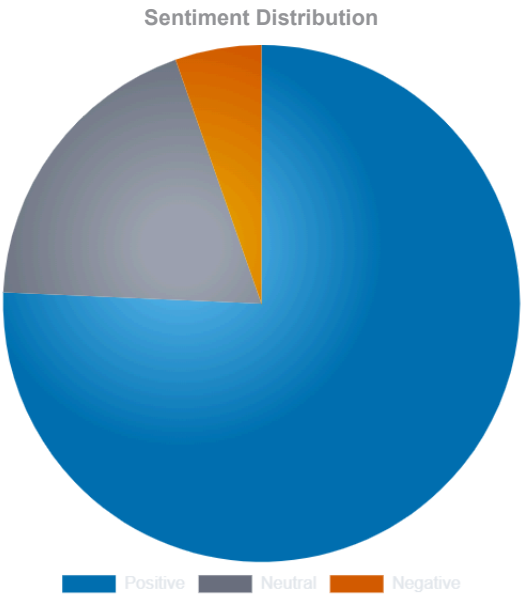
```
wordcloud = WordCloud(
    width=800,
    height=400,
    background_color='white'
).generate(positive_text)

plt.figure(figsize=(10,5))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.title('Most Common Positive Feedback Words')
plt.show()
```


```
from IPython.display import HTML

# 🔹 1. Get counts from pandas
sentiment_counts = df['library_sentiment_label'].value_counts()

positive = int(sentiment_counts.get('Positive', 0))
neutral  = int(sentiment_counts.get('Neutral', 0))
negative = int(sentiment_counts.get('Negative', 0))

# 🔹 2. Pass values to Chart.js
HTML(f"""
<!DOCTYPE html>
<html>
<head>
<script src="https://cdn.jsdelivr.net/npm/chart.js"></script>

<style>
  body {{
    margin: 0;
```

```
    background: transparent;
    font-family: Arial, sans-serif;
  }}

  .chart-box {{
    width: 100%;
    max-width: 420px;
    margin: auto;
    background: #0f172a;
    padding: 20px;
    border-radius: 20px;
    text-align: center;
  }}

  h3 {{
    color: #e5e7eb;
    margin-bottom: 10px;
    font-weight: 600;
  }}

  button {{
    margin-top: 10px;
    padding: 8px 14px;
    border: none;
    border-radius: 8px;
    background: #22c55e;
    color: #022c22;
    font-weight: bold;
    cursor: pointer;
  }}
</style>
</head>

<body>

<div class="chart-box">
  <h3>Sentiment Distribution</h3>
  <canvas id="pieChart"></canvas>
  <button onclick="downloadChart()">Export as PNG</button>
</div>

<script>
const ctx = document.getElementById("pieChart").getContext("2d");

// Data from pandas 👇
const dataCounts = [{positive}, {neutral}, {negative}];
const total = dataCounts.reduce((a, b) => a + b, 0);

// 🌈 Color-blind friendly gradients
const positiveGradient = ctx.createRadialGradient(150,150,30,150,150,150);
positiveGradient.addColorStop(0, "#56B4E9");
positiveGradient.addColorStop(1, "#0072B2");

const neutralGradient = ctx.createRadialGradient(150,150,30,150,150,150);
neutralGradient.addColorStop(0, "#9CA3AF");
neutralGradient.addColorStop(1, "#6B7280");
```

```
const negativeGradient = ctx.createRadialGradient(150,150,30,150,150,150);
negativeGradient.addColorStop(0, "#E69F00");
negativeGradient.addColorStop(1, "#D55E00");

new Chart(ctx, {{
  type: "pie",
  data: {{
    labels: ["Positive", "Neutral", "Negative"],
    datasets: [{{
      data: dataCounts,
      backgroundColor: [positiveGradient, neutralGradient, negativeGradient],
      borderWidth: 0,
      hoverOffset: 18
    }}]
  }},
  options: {{
    responsive: true,
    animation: {{
      animateRotate: true,
      duration: 1500,
      easing: "easeOutQuart"
    }},
    plugins: {{
      legend: {{
        position: "bottom",
        labels: {{
          color: "#e5e7eb",
          font: {{ size: 13 }}
        }}
      }},
      tooltip: {{
        callbacks: {{
          label: function(context) {{
            const value = context.parsed;
            const percent = ((value / total) * 100).toFixed(1);
            return `${{context.label}}: ${{value}} (${{percent}}%)`;
          }}
        }}
      }}
    }}
  }}
}});

// 🖼 Export
function downloadChart() {{
  const link = document.createElement('a');
  link.download = 'sentiment_distribution.png';
  link.href = document.getElementById('pieChart').toDataURL('image/png');
  link.click();
}}
</script>

</body>
</html>
```

```
""")
```



Define Custom Stopwords

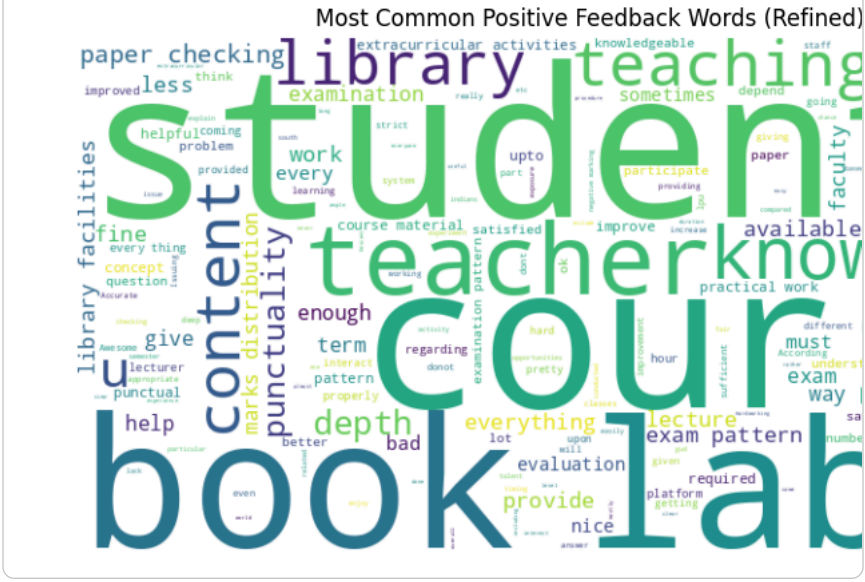
Reasoning: I need to import the default STOPWORDS, define custom stopwords like 'good' and 'excellent', and then combine them to create an updated stopwords list named `custom_stopwords`.

```
from wordcloud import STOPWORDS

# Create a new set of custom stopwords, including 'good' and 'excellent'
custom_additional_stopwords = {'good', 'excellent', 'great', 'best', 'well',

# Combine the default STOPWORDS with the custom stopwords
custom_stopwords = STOPWORDS.union(custom_additional_stopwords)

print("Custom stopwords defined successfully.")
```

```
Custom stopwords defined successfully.
```

Reasoning: The refined word cloud was generated after preprocessing the feedback text to remove generic sentiment words and noise. This allows clearer identification of domain-specific factors such as teaching quality, course structure, and laboratory facilities that contribute to positive student sentiment.

```
wordcloud_refined = WordCloud(
    width=800,
    height=400,
    background_color='white',
    stopwords=custom_stopwords
).generate(positive_text)

plt.figure(figsize=(10,5))
plt.imshow(wordcloud_refined, interpolation='bilinear')
plt.axis('off')
plt.title('Most Common Positive Feedback Words (Refined)')
plt.show()
```



⚠️ Limitations of the Study

1. Rule-Based Sentiment Analysis

This analysis uses **TextBlob and VADER**, which are lexicon-based sentiment models. These approaches may fail to correctly interpret **sarcasm, informal language, or contextual meaning** often present in student feedback.

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2. No Domain-Specific Fine-Tuning

The sentiment models were not trained specifically on **educational feedback data**. As a result, academic phrases such as *"strict evaluation"* or *"tough exams"* may be misclassified as negative even when feedback is constructive.

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3. Limited Dataset Size

The dataset contains feedback from **185 students**, which may not fully represent the views of a larger or more diverse student population.

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4. Lack of Demographic Information

The dataset does not include student demographics such as **year of study, department, or academic background**, limiting deeper segmentation analysis.

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5. Subjectivity of Feedback

Student feedback is inherently **subjective**, influenced by personal expectations and individual experiences.

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6. Language Constraints

The analysis assumes feedback is written in **standard English**.
Spelling errors, abbreviations, or mixed-language responses may reduce sentiment accuracy.

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7. Visualization Interpretation

Although interactive and accessible visualizations are used, some insights may require **statistical validation** beyond visual trends.