

EDS ACTIVITY NO.1

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DIV : CS6

ROLL NO. : CS62-36

SUBJECT : EDS

```
Users\HP\OneDrive\Desktop> python .\vivek_eds_activity_1.py ...
1 import pandas as pd
2 import numpy as np
3 import os
4 import kagglehub # Make sure you have kagglehub installed: pip install kagglehub
5
6 # --- 1. Download the dataset ---
7 print("Downloading SMS Spam Collection Dataset...")
8 try:
9     path = kagglehub.dataset_download("uciml/sms-spam-collection-dataset")
10    print(f"Dataset downloaded to: {path}")
11
12    # --- 2. Find the CSV file ---
13    file_path = None
14    # Look for the CSV file within the downloaded directory and its subdirectories
15    # The typical file name is 'spam.csv'
16    csv_filename = 'spam.csv'
17    print(f"Looking for '{csv_filename}' in downloaded directory...")
18    for root, dirs, files in os.walk(path):
19        if csv_filename in files:
20            file_path = os.path.join(root, csv_filename)
21            break
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```

```

23 df = pd.DataFrame() # Initialize an empty DataFrame
24
25 if file_path:
26     print(f"Found dataset file at: {file_path}")
27     # --- 3. Load the dataset ---
28     try:
29         # This dataset is often tab-separated, and might not have headers by default
30         # Let's try reading with common options or assume it's simple csv
31         # Based on typical structure, it's two columns v1 (label) and v2 (text)
32         # Let's try reading as CSV first, if that fails, try tab-separated
33         try:
34             df = pd.read_csv(file_path, encoding='latin-1')
35             # Check if columns look like standard v1, v2
36             if 'v1' in df.columns and 'v2' in df.columns:
37                 df = df[['v1', 'v2']] # Select only relevant columns
38                 df.columns = ['Label', 'Message'] # Rename columns for clarity
39                 print("Dataset loaded successfully with columns 'Label' and 'Message'.")
40             else:
41                 # Try reading as tab-separated if CSV didn't yield expected columns
42                 print("CSV read didn't yield expected columns. Trying tab separation...")
43                 df = pd.read_csv(file_path, sep='\t', header=None, names=['Label', 'Message'], encoding='latin-1')

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

1 Message      5572 non-null  object
2 Message_Length  5572 non-null  int64
3 Word_Count    5572 non-null  int64
dtypes: int64(2), object(2)
memory usage: 174.3+ KB

```

Dataset Head:

	Label	Message	Message_Length	Word_Count
0	ham	Go until jurong point, crazy.. Available only ...	111	20
1	ham	Ok lar... Joking wif u oni...	29	6
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...	155	28

```

print("Dataset loaded successfully with columns 'Label' and 'Message' using tab separation.")

```

```

except Exception as e_read:
    print(f"Error reading CSV/TSV file: {e_read}")

# --- Initial Data Prep (if loading was successful) ---
if not df.empty:
    # Add a message length column for analysis
    df['Message_Length'] = df['Message'].str.len()
    print("Added 'Message_Length' column.")

    # Add a word count column (simple split by space)
    df['Word_Count'] = df['Message'].str.split().str.len()
    print("Added 'Word_Count' column.")

    print("\nDataset Info:")
    df.info()
    print("\nDataset Head:")
    print(df.head())

except Exception as e_load:
    print(f"An error occurred while loading or processing the dataset: {e_load}")
    df = pd.DataFrame() # Ensure df is empty if loading fails

else:
    print(f"Error: '{csv_filename}' not found in the downloaded directory or its subdirectories.")
    df = pd.DataFrame() # Ensure df is empty if file not found

except Exception as e_download:
    print(f"An error occurred during dataset download: {e_download}")
    df = pd.DataFrame() # Ensure df is empty if download fails

```

PROBLEM STATEMENTS AND ANSWERS :

1 TO 5

```
83 # Problem Statement 1: What is the total number of messages in the dataset?
84 total_messages = len(df)
85 print(f"\n1. Total number of messages: {total_messages}")
86
87 # Problem Statement 2: How many messages are labeled as 'spam'?
88 spam_count = df[df['Label'] == 'spam'].shape[0]
89 print(f"\n2. Number of spam messages: {spam_count}")
90
91 # Problem Statement 3: How many messages are labeled as 'ham'?
92 ham_count = df[df['Label'] == 'ham'].shape[0]
93 print(f"\n3. Number of ham messages: {ham_count}")
94
95 # Problem Statement 4: What is the proportion of spam messages in the dataset?
96 proportion_spam = spam_count / total_messages if total_messages > 0 else 0
97 print(f"\n4. Proportion of spam messages: {proportion_spam:.2%}")
98
99 # Problem Statement 5: What is the proportion of ham messages in the dataset?
100 proportion_ham = ham_count / total_messages if total_messages > 0 else 0
101 print(f"\n5. Proportion of ham messages: {proportion_ham:.2%}")
102
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

1	ham	Ok lar... Joking wif u oni...	29	6
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...	155	28
3	ham	U dun say so early hor... U c already then say...	49	11
4	ham	Nah I don't think he goes to usf, he lives aro...	61	13

--- Performing Data Analysis Tasks ---

1. Total number of messages: 5572
2. Number of spam messages: 747
3. Number of ham messages: 4825
4. Proportion of spam messages: 13.41%
5. Proportion of ham messages: 86.59%

6 TO 8 :

```
103 # Problem Statement 6: Display the column names of the DataFrame.
104 column_names = df.columns.tolist()
105 print(f"\n6. Column names: {column_names}")
106
107 # Problem Statement 7: Find the message with the longest character length.
108 if 'Message_Length' in df.columns and 'Message' in df.columns:
109     longest_message_index = df['Message_Length'].idxmax()
110     longest_message = df.loc[longest_message_index]
111     print(f"\n7. Message with the longest character length ({longest_message['Message_Length']} characters):")
112     print(f"    Label: {longest_message['Label']}")
113     print(f"    Message: {longest_message['Message'][:100]}..." # Print first 100 chars
114 else:
115     print("\n7. Required column(s) ('Message_Length' or 'Message') not found.")
116
117
118 # Problem Statement 8: Find the message with the shortest character length (excluding empty messages).
119 if 'Message_Length' in df.columns and 'Message' in df.columns:
120     shortest_message_index = df[df['Message_Length'] > 0]['Message_Length'].idxmin()
121     shortest_message = df.loc[shortest_message_index]
122     print(f"\n8. Message with the shortest character length ({shortest_message['Message_Length']} characters):")
123     print(f"    Label: {shortest_message['Label']}")
124     print(f"    Message: {shortest_message['Message']}")
125 else:
126     print("\n8. Required column(s) ('Message_Length' or 'Message') not found.")
127
128
129 # Problem Statement 9: Calculate the average character length of all messages.
130 if 'Message_Length' in df.columns:
131     average_length = df['Message_Length'].mean()
132     print(f"\n9. Average message character length: {average_length:.2f}")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

6. Column names: ['Label', 'Message', 'Message_Length', 'Word_Count']

7. Message with the longest character length (910 characters):

Label: ham

Message: For me the love should start with attraction.i should feel that I need her every time around me.she ...

8. Message with the shortest character length (2 characters):

Label: ham

Message: Ok

9 TO 11:

```
127
128
129     # Problem Statement 9: Calculate the average character length of all messages.
130     if 'Message_Length' in df.columns:
131         average_length = df['Message_Length'].mean()
132         print(f"\n9. Average message character length: {average_length:.2f}")
133     else:
134         print("\n9. 'Message_Length' column not found.")
135
136
137     # Problem Statement 10: Calculate the average character length of spam messages.
138     if 'Message_Length' in df.columns and 'Label' in df.columns:
139         spam_messages = df[df['Label'] == 'spam']
140         if not spam_messages.empty:
141             average_length_spam = spam_messages['Message_Length'].mean()
142             print(f"\n10. Average character length of spam messages: {average_length_spam:.2f}")
143         else:
144             print("\n10. No spam messages found.")
145     elif not df.empty:
146         print("\n10. Required column(s) ('Message_Length' or 'Label') not found.")
147
148
149     # Problem Statement 11: Calculate the average character length of ham messages.
150     if 'Message_Length' in df.columns and 'Label' in df.columns:
151         ham_messages = df[df['Label'] == 'ham']
152         if not ham_messages.empty:
153             average_length_ham = ham_messages['Message_Length'].mean()
154             print(f"\n11. Average character length of ham messages: {average_length_ham:.2f}")
155         else:
156             print("\n11. No ham messages found.")
157     elif not df.empty:
158         print("\n11. Required column(s) ('Message_Length' or 'Label') not found.")
159
160
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Label: ham
Message: Ok

9. Average message character length: 80.12

10. Average character length of spam messages: 138.87

11. Average character length of ham messages: 71.02

12. First 5 messages containing 'free':

12 TO 14:

```

161 # Problem Statement 12: Find and display the first 5 messages containing the word 'free'.
162 if 'Message' in df.columns:
163     keyword = 'free'
164     messages_with_keyword = df[df['Message'].str.contains(keyword, case=False, na=False)].head()
165     print(f"\n12. First 5 messages containing '{keyword}':")
166     if not messages_with_keyword.empty:
167         for index, row in messages_with_keyword.iterrows():
168             print(f"    - Label: {row['Label']}, Message: {row['Message'][:80]}...") # Print first 80 chars
169     else:
170         print(f"    No messages found containing '{keyword}'.")
171 else:
172     print("\n12. 'Message' column not found.")
173
174
175 # Problem Statement 13: Count how many messages contain the word 'win'.
176 if 'Message' in df.columns:
177     keyword = 'win'
178     count_with_keyword = df['Message'].str.contains(keyword, case=False, na=False).sum()
179     print(f"\n13. Number of messages containing '{keyword}': {count_with_keyword}")
180 else:
181     print("\n13. 'Message' column not found.")
182
183
184 # Problem Statement 14: Display the value counts for the 'Label' column.
185 if 'Label' in df.columns:
186     label_counts = df['Label'].value_counts()
187     print(f"\n14. Value counts for 'Label' column:")
188     print(label_counts)
189 else:
190     print("\n14. 'Label' column not found.")

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

12. First 5 messages containing 'free':
- Label: spam, Message: Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 8...
- Label: spam, Message: FreeMsg Hey there darling it's been 3 week's now and no word back! I'd like some...
- Label: spam, Message: Had your mobile 11 months or more? U R entitled to Update to the latest colour m...
- Label: spam, Message: URGENT! You have won a 1 week FREE membership in our £100,000 Prize Jackpot! Tx...
- Label: spam, Message: 07732584351 - Rodger Burns - MSG = We tried to call you re your reply to our sms...

```

```

13. Number of messages containing 'win': 166

```

```

14. Value counts for 'Label' column:

```

```

Label
ham      4825
spam      747
Name: count, dtype: int64

```

15 AND 16 :

```
192
193 # Problem Statement 15: Find the message with the most words.
194 if 'Word_Count' in df.columns and 'Message' in df.columns:
195     longest_word_count_index = df['Word_Count'].idxmax()
196     message_most_words = df.loc[longest_word_count_index]
197     print(f"\n15. Message with the most words ({message_most_words['Word_Count']} words):")
198     print(f"    Label: {message_most_words['Label']}")
199     print(f"    Message: {message_most_words['Message'][:100]}...") # Print first 100 chars
200 else:
201     print("\n15. Required column(s) ('Word_Count' or 'Message') not found.")
202
203
204 # Problem Statement 16: Display the first 10 spam messages.
205 if 'Label' in df.columns and 'Message' in df.columns:
206     first_10_spam = df[df['Label'] == 'spam'].head(10)
207     print(f"\n16. First 10 spam messages:")
208     if not first_10_spam.empty:
209         for index, row in first_10_spam.iterrows():
210             print(f"    - {row['Message'][:100]}...") # Print first 100 chars
211     else:
212         print("    No spam messages found.")
213 elif not df.empty:
214     print("\n16. Required column(s) ('Label' or 'Message') not found.")
215
216
217 # Problem Statement 17: Display the first 10 ham messages
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

15. Message with the most words (171 words):

Label: ham

Message: For me the love should start with attraction.i should feel that I need her every time around me.she ...

16. First 10 spam messages:

- Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 87121 to receive entr...
- FreeMsg Hey there darling it's been 3 week's now and no word back! I'd like some fun you up for it s...
- WINNER!! As a valued network customer you have been selected to receive a £900 prize reward! To clai...
- Had your mobile 11 months or more? U R entitled to Update to the latest colour mobiles with camera f...
- SIX chances to win CASH! From 100 to 20,000 pounds txt> CSH11 and send to 87575. Cost 150p/day, 6day...
- URGENT! You have won a 1 week FREE membership in our £100,000 Prize Jackpot! Txt the word: CLAIM to...
- XXXMobileMovieClub: To use your credit, click the WAP link in the next txt message or click here>> h...
- England v Macedonia - dont miss the goals/team news. Txt ur national team to 87077 eg ENGLAND to 870...
- Thanks for your subscription to Ringtone UK your mobile will be charged £5/month Please confirm by ...
- 07732584351 - Rodger Burns - MSG = We tried to call you re your reply to our sms for a free nokia mo...
- 07732584351 - Rodger Burns - MSG = We tried to call you re your reply to our sms for a free nokia mo...

17 AND 18:

```
216
217 # Problem Statement 17: Display the first 10 ham messages.
218 if 'Label' in df.columns and 'Message' in df.columns:
219     first_10_ham = df[df['Label'] == 'ham'].head(10)
220     print(f"\n17. First 10 ham messages:")
221     if not first_10_ham.empty:
222         for index, row in first_10_ham.iterrows():
223             print(f"    - {row['Message'][:100]}...") # Print first 100 chars
224     else:
225         print("    No ham messages found.")
226 elif not df.empty:
227     print("\n17. Required column(s) ('Label' or 'Message') not found.")
228
229
230 # Problem Statement 18: Calculate the standard deviation of message length.
231 if 'Message_Length' in df.columns:
232     std_dev_length = df['Message_Length'].std()
233     print(f"\n18. Standard deviation of message character length: {std_dev_length:.2f}")
234 else:
235     print("\n18. 'Message_Length' column not found.")
236
237
238 # Problem Statement 19: Calculate the average word count for spam messages.
239 if 'Word_Count' in df.columns and 'Label' in df.columns:
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
17. First 10 ham messages:
- Go until jurong point, crazy.. Available only in bugis n great world la e buffet... Cine there got a...
- Ok lar... Joking wif u oni.....
- U dun say so early hor... U c already then say.....
- Nah I don't think he goes to usf, he lives around here though...
- Even my brother is not like to speak with me. They treat me like aids patent....
- As per your request 'Melle Melle (Oru Minnaminunginte Nurungu Vettam)' has been set as your callertu...
- I'm gonna be home soon and i don't want to talk about this stuff anymore tonight, k? I've cried enou...
- I've been searching for the right words to thank you for this breather. I promise i wont take your h...
- I HAVE A DATE ON SUNDAY WITH WILL!!!!...
- Oh k...i'm watching here:))...

18. Standard deviation of message character length: 59.69
```


19 AND 20:

```
237
238 # Problem Statement 19: Calculate the average word count for spam messages.
239 if 'Word_Count' in df.columns and 'Label' in df.columns:
240     spam_messages = df[df['Label'] == 'spam']
241     if not spam_messages.empty:
242         average_word_count_spam = spam_messages['Word_Count'].mean()
243         print(f"\n19. Average word count for spam messages: {average_word_count_spam:.2f}")
244     else:
245         print("\n19. No spam messages found.")
246 elif not df.empty:
247     print("\n19. Required column(s) ('Word_Count' or 'Label') not found.")
248
249
250 # Problem Statement 20: Count messages where the character length is greater than 200.
251 if 'Message_Length' in df.columns:
252     long_messages_count = df[df['Message_Length'] > 200].shape[0]
253     print(f"\n20. Number of messages with character length > 200: {long_messages_count}")
254 else:
255     print("\n20. 'Message_Length' column not found.")
256
257 else:
258     print("\nDataFrame is empty. Cannot perform analysis tasks.")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

18. Standard deviation of message character length: 59.69

19. Average word count for spam messages: 23.85

20. Number of messages with character length > 200: 112

PS C:\Users\HP\OneDrive\Desktop\vvk eds assg1>

THANKYOU