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◆ AI-4.5.py > classify_multiple_emails
1 #Management wants to automatically classify emails into categories like "Billing", "Technical Support", "Feedback", and "Others" before assigning them to a
2 #Create or collect 10 short email samples, each belonging to one of the 4 categories.
3 #Classify the above below samples into one of the following categories: Billing, Technical Support, Feedback, Others."
4 def classify_email(email_content):
5     """Classify the email content into one of the categories: Billing, Technical Support, Feedback, Others.
6     Parameters:
7     email_content (str): The content of the email to classify.
8     Returns:
9     str: The category of the email."""
10    email_content = email_content.lower()
11
12    if any(keyword in email_content for keyword in ["invoice", "payment", "billing", "due date", "overdue"]):
13        return "Billing"
14    elif any(keyword in email_content for keyword in ["issue", "error", "support", "installation", "bug", "connectivity"]):
15        return "Technical Support"
16    elif any(keyword in email_content for keyword in ["feedback", "suggestion", "purchase", "quality", "service"]):
17        return "Feedback"
18    else:
19        return "Others"
20
21 email_samples = [
22     ("Billing", "Subject: Invoice #12345\nDear Customer, your invoice for the month of June is attached. Please make the payment by the due date.\nBest re
23     ("Technical Support", "Subject: Issue with Software Installation\nHello Support Team, I am facing issues while installing the software on my computer.
24     ("Feedback", "Subject: Feedback on Recent Purchase\nHi Team, I recently purchased a product from your store and I am very satisfied with the quality ar
25     ("Others", "Subject: Meeting Reminder\nDear Team, this is a reminder for our meeting scheduled tomorrow at 10 AM in the conference room. Please be on t
26     ("Billing", "Subject: Payment Confirmation\nDear Customer, we have received your payment for the invoice #67890. Thank you for your prompt payment.\nNB
27     ("Technical Support", "Subject: Network Connectivity Issue\nHello, I am experiencing frequent disconnections from the internet. Can you please help me
28     ("Feedback", "Subject: Suggestion for New Features\nHi Team, I would like to suggest a few new features for your app that I believe would enhance user
29     ("Others", "Subject: Holiday Announcement\nDear All, please note that the office will be closed next Friday in observance of the holiday. Enjoy your d
30     ("Billing", "Subject: Overdue Payment Notice\nDear Customer, our records indicate that your payment for invoice #54321 is overdue. Please make the paym
31     ("Technical Support", "Subject: Software Bug Report\nHello Support, I have encountered a bug in the latest version of your software. It crashes when I
32 ]
33 print(classify_email(email_samples[1][1])) # Output: Technical Support
34 print(classify_email(email_samples[4][1])) # Output: Billing
35 print(classify_email(email_samples[7][1])) # Output: Others
36
37 #Classify the above email samples into one of the following categories: Billing, Technical Support, Feedback, Others.Email: 'I have not received my invoice
38 def classify_email_single(email_content):
39     """Classify a single email content into one of the categories: Billing, Technical Support, Feedback, Others.
40     Parameters:

```

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AI-4.5.py > classify_multiple_emails
37 def classify_email_single(email_content):
38     Parameters:
39         email_content (str): The content of the email to classify.
40     Returns:
41         str: The category of the email.
42     """
43     email_content = email_content.lower()
44
45     if any(keyword in email_content for keyword in ["invoice", "payment", "billing", "due date", "overdue"]):
46         return "Billing"
47     elif any(keyword in email_content for keyword in ["issue", "error", "support", "installation", "bug", "connectivity"]):
48         return "Technical Support"
49     elif any(keyword in email_content for keyword in ["feedback", "suggestion", "purchase", "quality", "service"]):
50         return "Feedback"
51     else:
52         return "Others"
53
54 # Example Usage:
55 email_to_classify = "I have not received my invoice for last month."
56 print(classify_email_single(email_to_classify)) # Output: Billing
57
58 #Classify the below email samples into one of the following categories: Billing, Technical Support, Feedback, Others.Email: 'I have not received my invoice
59 def classify_multiple_emails(email_contents):
60     """Classify multiple email contents into one of the categories: Billing, Technical Support, Feedback, Others.
61     Parameters:
62         email_contents (list): A list of email contents to classify.
63     Returns:
64         list: A list of categories corresponding to each email.
65     """
66     categories = []
67     for email_content in email_contents:
68         email_content = email_content.lower()
69
70         if any(keyword in email_content for keyword in ["invoice", "payment", "billing", "due date", "overdue"]):
71             categories.append("Billing")
72         elif any(keyword in email_content for keyword in ["issue", "error", "support", "installation", "bug", "connectivity"]):
73             categories.append("Technical Support")
74         elif any(keyword in email_content for keyword in ["feedback", "suggestion", "purchase", "quality", "service"]):
75             categories.append("Feedback")
76         else:
77             categories.append("Others")
78     return categories
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```

Output:

```

Technical Support
Billing
Others
Billing
Billing
o ['Billing', 'Technical Support']

```

Justification:

This task demonstrates how **prompt engineering** can automate email sorting without building a custom machine learning model. **Zero-shot prompting** works well for clearly defined emails, but may struggle when categories overlap. **One-shot prompting** improves the model's understanding by providing a reference example. **Few-shot prompting** achieves higher accuracy by allowing the model to learn category patterns from multiple examples. Overall, this approach reduces manual effort and significantly improves operational efficiency.

Task 2: Travel Query Classification

A travel assistant must classify queries into Flight Booking, Hotel Booking, Cancellation, or General Travel Info.

Tasks:

- a. Prepare labeled travel queries.
- b. Apply Zero-shot prompting.
- c. Apply One-shot prompting.
- d. Apply Few-shot prompting.
- e. Compare response consistency.

Prompt :

A travel assistant must classify queries into Flight Booking, Hotel Booking, Cancellation, or General Travel Info. Tasks: a. Prepare labeled travel queries.

Classify the travel query into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "I need to book a flight to New York next week.",

Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "I need to book a flight to New York next week.", "Can you help me find a hotel in Paris?"

Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "Can you help me find a hotel in Paris?" "I would like to cancel my reservation for tomorrow.", "What are the travel restrictions for Italy?"

Code:

```
Al-4.5.py > classify_multiple_travel_queries
116 def classify_single_travel_query(query):
117     """
124     if any(keyword in query for keyword in ["flight", "airline", "ticket", "departure", "arrival"]):
125         return "Flight Booking"
126     elif any(keyword in query for keyword in ["hotel", "accommodation", "room", "stay", "booking"]):
127         return "Hotel Booking"
128     elif any(keyword in query for keyword in ["cancel", "cancellation", "refund", "reschedule"]):
129         return "Cancellation"
130     else:
131         return "General Travel Info"
132 # Example Usage:
133 single_query = "Can you help me find a hotel in Paris?"
134 print(classify_single_travel_query(single_query)) # Output: Hotel Booking
135
136 #Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "I need to book a flight
137 def classify_multiple_travel_queries(queries):
138     """Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info.
139     Parameters:
140     queries (list): A list of travel queries to classify.
141     Returns:
142     list: A list of categories corresponding to each travel query."""
143     categories = []
144     for query in queries:
145         query = query.lower()
146
147         if any(keyword in query for keyword in ["flight", "airline", "ticket", "departure", "arrival"]):
148             categories.append("Flight Booking")
149         elif any(keyword in query for keyword in ["hotel", "accommodation", "room", "stay", "booking"]):
150             categories.append("Hotel Booking")
151         elif any(keyword in query for keyword in ["cancel", "cancellation", "refund", "reschedule"]):
152             categories.append("Cancellation")
153         else:
154             categories.append("General Travel Info")
155     return categories
156 # Example Usage:
157 queries_to_classify = [
158     "I need to book a flight to New York next week.",
159     "Can you help me find a hotel in Paris?"
160 ]
```

```

AI-4.5.py > classify_multiple_travel_queries
84
85 #A travel assistant must classify queries into Flight Booking, Hotel Booking, Cancellation, or General Travel Info. Tasks: a. Prepare labeled travel queri
86 def classify_travel_query(query):
87     """Classify the travel query into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info.
88     Parameters:
89     query (str): The travel query to classify.
90     Returns:
91     str: The category of the travel query."""
92     query = query.lower()
93
94     if any(keyword in query for keyword in ["flight", "airline", "ticket", "departure", "arrival"]):
95         return "Flight Booking"
96     elif any(keyword in query for keyword in ["hotel", "accommodation", "room", "stay", "booking"]):
97         return "Hotel Booking"
98     elif any(keyword in query for keyword in ["cancel", "cancellation", "refund", "reschedule"]):
99         return "Cancellation"
100    else:
101        return "General Travel Info"
102
103    # Example Usage:
104    travel_queries = [
105        "I need to book a flight to New York next week.",
106        "Can you help me find a hotel in Paris?",
107        "I would like to cancel my reservation for tomorrow.",
108        "What are the travel restrictions for Italy?"
109    ]
110    for query in travel_queries:
111        print(f"Query: {query}\nCategory: {classify_travel_query(query)}\n")
112    # Output: # Query: I need to book a flight to New York next week.
113    # Category: Flight Booking
114
115    #Classify the travel query into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "I need to book a flight to New Y
116    def classify_single_travel_query(query):
117        """Classify a single travel query into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info.
118        Parameters:
119        query (str): The travel query to classify.
120        Returns:
121        str: The category of the travel query."""
122        query = query.lower()

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#Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info. "Can you help me find a hot
def classify_more_travel_queries(queries):
    """Classify multiple travel queries into one of the categories: Flight Booking, Hotel Booking, Cancellation, General Travel Info.
    Parameters:
    queries (list): A list of travel queries to classify.
    Returns:
    list: A list of categories corresponding to each travel query."""
    categories = []
    for query in queries:
        query = query.lower()

        if any(keyword in query for keyword in ["flight", "airline", "ticket", "departure", "arrival"]):
            categories.append("Flight Booking")
        elif any(keyword in query for keyword in ["hotel", "accommodation", "room", "stay", "booking"]):
            categories.append("Hotel Booking")
        elif any(keyword in query for keyword in ["cancel", "cancellation", "refund", "reschedule"]):
            categories.append("Cancellation")
        else:
            categories.append("General Travel Info")
    return categories
# Example Usage:
more_queries_to_classify = [
    "Can you help me find a hotel in Paris?",
    "I would like to cancel my reservation for tomorrow.",
    "What are the travel restrictions for Italy?"
]
print(classify_more_travel_queries(more_queries_to_classify)) # Output: ['Hotel Booking', 'Cancellation', 'General Travel Info']

```

Output:

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Query: I need to book a flight to New York next week.
Category: Flight Booking

Query: Can you help me find a hotel in Paris?
Category: Hotel Booking

Query: I would like to cancel my reservation for tomorrow.
Category: Cancellation

Query: What are the travel restrictions for Italy?
Category: General Travel Info

Hotel Booking
['Flight Booking', 'Hotel Booking']
['Hotel Booking', 'Cancellation', 'General Travel Info']
PS D:\AI>

```

Justification:

Travel-related queries often use similar language to express different user intents. Because zero-shot prompting lacks contextual examples, it may misclassify such queries. One-shot prompting improves intent detection by providing a basic reference example. Few-shot prompting further enhances consistency and accuracy by exposing the model to multiple

intent patterns. This task highlights the importance of contextual examples in building effective user-facing assistants.

Task 3 Programming Question Type Identification

Scenario:

A coding help chatbot must classify queries into Syntax Error, Logic Error, Optimization, or Conceptual Question.

Tasks:

- a. Prepare coding-related user queries.
- b. Perform Zero-shot classification.
- c. Perform One-shot classification.
- d. Perform Few-shot classification.
- e. Analyze improvements in technical accuracy.

Prompt :

A coding help chatbot must classify queries into Syntax Error, Logic Error, Optimization, or Conceptual Question. Tasks:a. Prepare coding-related user queries.b. Perform Zero-shot classification.c. Perform One-shot classification.d. Perform Few-shot classification.

Code:

```
191 #A coding help chatbot must classify queries into Syntax Error, Logic Error, Optimization, or Conceptual Question. Tasks:a. Prepare coding-related user qu
192 def classify_coding_query(query):
193     """Classify the coding query into one of the categories: Syntax Error, Logic Error, Optimization, Conceptual Question.
194     Parameters:
195     query (str): The coding query to classify.
196     Returns:
197     str: The category of the coding query."""
198     query = query.lower()
199
200     if any(keyword in query for keyword in ["syntax error", "unexpected indent", "missing parenthesis", "invalid syntax"]):
201         return "Syntax Error"
202     elif any(keyword in query for keyword in ["logic error", "wrong output", "incorrect result", "bug"]):
203         return "Logic Error"
204     elif any(keyword in query for keyword in ["optimize", "performance", "efficiency", "speed up"]):
205         return "Optimization"
206     elif any(keyword in query for keyword in ["how to", "what is", "explain", "concept"]):
207         return "Conceptual Question"
208     else:
209         return "Others"
210
211 # Example Usage:
212 coding_queries = [
213     "I am getting a syntax error when I run my Python code.",
214     "My program is producing the wrong output, what could be the logic error?",
215     "How can I optimize my code for better performance?",
216     "Can you explain the concept of recursion in programming?"
217 ]
218 for query in coding_queries:
219     print(f"Query: {query}\nCategory: {classify_coding_query(query)}\n")
220 # Output:# Query: I am getting a syntax error when I run my Python code.
221 # Category: Syntax Error
222 # Query: My program is producing the wrong output, what could be the logic error?
223 # Category: Logic Error
224 # Query: How can I optimize my code for better performance?
225 # Category: Optimization
226 # Query: Can you explain the concept of recursion in programming?
227 # Category: Conceptual Question
```

Output:


```
Query: I am getting a syntax error when I run my Python code.  
Category: Syntax Error  
  
Query: My program is producing the wrong output, what could be the logic error?  
Category: Logic Error  
  
Query: How can I optimize my code for better performance?  
Category: Optimization  
  
Query: Can you explain the concept of recursion in programming?  
Category: Conceptual Question  
  
PS D:\AI>
```

Justification :

Programming-related queries require strong technical and contextual understanding. Zero-shot prompting may confuse syntax-related and logic-related issues due to the absence of examples. One-shot prompting provides initial guidance to the model. Few-shot prompting significantly improves technical accuracy by exposing the model to multiple coding scenarios. This demonstrates how examples enhance domain-specific query classification.

Task 4. Social Media Post Categorization

Scenario:

A social media analytics tool must classify posts into Promotion, Complaint, Appreciation, or Inquiry.

Tasks:

1. Prepare sample social media posts.
2. Use Zero-shot prompting.
3. Use One-shot prompting.
4. Use Few-shot prompting.
5. Analyze informal language handling.

Prompt :

Social Media Post Categorization, A social media analytics tool must classify posts into Promotion, Complaint, Appreciation, or Inquiry. 1. Prepare sample social media posts. 2. Use Zero-shot prompting. 3. Use One-shot prompting. 4. Use Few-shot prompting. 5. Analyze informal language handling.

Code:

```
229 #Social Media Post Categorization
230 # Scenario:
231 # A social media analytics tool must classify posts into Promotion,
232 # Complaint, Appreciation, or Inquiry.
233 # Tasks:
234 # 1. Prepare sample social media posts.
235 # 2. Use Zero-shot prompting.
236 # 3. Use One-shot prompting.
237 # 4. Use Few-shot prompting.
238 # 5. Analyze informal language handling.
239 def classify_social_media_post(post):
240     """Classify the social media post into one of the categories: Promotion, Complaint, Appreciation, Inquiry.
241     Parameters:
242     post (str): The social media post to classify.
243     Returns:
244     str: The category of the social media post."""
245     post = post.lower()
246
247     if any(keyword in post for keyword in ["buy now", "sale", "discount", "offer", "promo"]):
248         return "Promotion"
249     elif any(keyword in post for keyword in ["not happy", "disappointed", "bad service", "complaint", "issue"]):
250         return "Complaint"
251     elif any(keyword in post for keyword in ["thank you", "great job", "love it", "appreciate", "awesome"]):
252         return "Appreciation"
253     elif any(keyword in post for keyword in ["how to", "where can i", "what is", "help me"]):
254         return "Inquiry"
255     else:
256         return "Others"
257
258 # Example Usage:
259 social_media_posts = [
260     "Huge sale on all products! Buy now and save big!",
261     "I'm really disappointed with the service I received today.",
262     "Thank you for the amazing support! You guys are awesome!",
263     "Can someone help me with my account settings?",
264     "Just wanted to share how much I love this new app!"
265 ]
266 for post in social_media_posts:
267     print(f"Post: {post}\nCategory: {classify_social_media_post(post)}\n")
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Output:

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• Post: Huge sale on all products! Buy now and save big!
  Category: Promotion

Post: I'm really disappointed with the service I received today.
Category: Complaint

Post: Thank you for the amazing support! You guys are awesome!
Category: Appreciation

Post: Can someone help me with my account settings?
Category: Inquiry

Post: Just wanted to share how much I love this new app!
Category: Others
```

Justification:

Social media posts often contain informal language, slang, and emojis, making tone and intent harder to interpret. Zero-shot prompting may struggle to classify such content accurately. One-shot prompting provides limited improvement by offering a basic reference.

Few-shot prompting handles informal and unstructured expressions more effectively. This task demonstrates the importance of examples in understanding unstructured text.