

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm in python to output a description of the set of all hypotheses consistent with the training examples

Program:

```
import csv
import copy

# Load CSV data
with open("training_data.csv") as f:
    data = list(csv.reader(f))

# Separate attributes and target
concepts = data[1:] # remove header
attributes = [row[:-1] for row in concepts]
target = [row[-1] for row in concepts]

#Initialize S and G
num_attributes = len(attributes[0])
S = ['0'] * num_attributes
G = [['?'] * num_attributes]

print("Initial S:", S)
print("Initial G:", G)
print("\n")

for i in range(len(attributes)):
    if target[i] == "Yes": # Positive example
        for j in range(num_attributes):
            if S[j] == '0':
                S[j] = attributes[i][j]
            elif S[j] != attributes[i][j]:
                S[j] = '?'

# Remove inconsistent hypotheses from G
G = [g for g in G if all(g[k] == '?' or g[k] == S[k] for k in range(num_attributes))]
```

```

else: # Negative example

    new_G = []

    for g in G:

        for j in range(num_attributes):

            if g[j] == '?':

                if attributes[i][j] != S[j]:

                    new_hypothesis = copy.deepcopy(g)

                    new_hypothesis[j] = S[j]

                    new_G.append(new_hypothesis)

    G = new_G

print("Step", i+1)

print("S:", S)

print("G:", G)

print("\n")

print("Final Specific Hypothesis (S):", S)

print("Final General Hypotheses (G):", G)

```

Output:

```

File Edit Shell Debug Options Window Help
['sunny', 'warm', '?', 'strong', '?', '?']

The Maximally specific hypothesis for the training instance is
['sunny', 'warm', '?', 'strong', '?', '?']
>>
===== RESTART: C:/Users/saimo/OneDrive/Desktop/ML Programs/2.py =====
Initial S: ['0', '0', '0', '0', '0', '0']
Initial G: [['?', '?', '?', '?', '?', '?']]

Step 1
S: ['Sunny', 'Warm', 'Normal', 'Strong', 'Warm', 'Same']
G: [['?', '?', '?', '?', '?', '?']]

Step 2
S: ['Sunny', 'Warm', '?', 'Strong', 'Warm', 'Same']
G: [['?', '?', '?', '?', '?', '?']]

Step 3
S: ['Sunny', 'Warm', '?', 'Strong', 'Warm', 'Same']
G: [['Sunny', '?', '?', '?', '?', '?'], ['?', 'Warm', '?', '?', '?', '?'], ['?',
 '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', 'Same']]

Step 4
S: ['Sunny', 'Warm', '?', 'Strong', '?', '?']
G: [['Sunny', '?', '?', '?', '?', '?'], ['?', 'Warm', '?', '?', '?', '?'], ['?',
 '?', '?', '?', '?', '?']]

Final Specific Hypothesis (S): ['Sunny', 'Warm', '?', 'Strong', '?', '?']
Final General Hypotheses (G): [['Sunny', '?', '?', '?', '?', '?'], ['?', 'Warm',
 '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]
>>

```