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import numpy as np
import pandas as pd

data = pd.read_csv('enjoysport1.csv')
concepts = np.array(data.iloc[:,0:-1])
print("\nInstances are:\n",concepts)

→ Instances are:
[['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
 ['sunny' 'warm' 'high' 'strong' 'warm' 'same']
 ['rainy' 'cold' 'high' 'strong' 'warm' 'change']
 ['sunny' 'warm' 'high' 'strong' 'cool' 'change']]

target = np.array(data.iloc[:, -1])
print("\nTarget Values are: ", target)

→ Target Values are: ['yes' 'yes' 'no' 'yes']

def learn(concepts, target):
    specific_h = concepts[0].copy()
    print("\nInitialization of specific_h and general_h")
    print("\nSpecific Boundary: ", specific_h)
    general_h = [["?" for i in range(len(specific_h))] for i in range(len(specific_h))]

    print("\nGeneral Boundary: ", general_h)

    for i, h in enumerate(concepts):
        print("\nInstance", i+1, "is", h)
        if target[i] == "yes":
            print("Instance is Positive ")
            for x in range(len(specific_h)):
                if h[x] != specific_h[x]:
                    specific_h[x] = '?'
                    general_h[x][x] = '?'

        if target[i] == "no":
            print("Instance is Negative ")
            for x in range(len(specific_h)):
                if h[x] != specific_h[x]:
                    general_h[x][x] = specific_h[x]
                else:
                    general_h[x][x] = '?'

    print("Specific Boundary after", i+1, "Instance is", specific_h)
    print("General Boundary after", i+1, "Instance is", general_h)
    print("\n")

    indices = [i for i, val in enumerate(general_h) if val == ['?', '?', '?', '?', '?', '?']]
    for i in indices:
        general_h.remove(['?', '?', '?', '?', '?', '?'])
    return specific_h, general_h

s_final, g_final = learn(concepts, target)

→ Initialization of specific_h and general_h

Specific Boundary: ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']

Generic Boundary: [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]

Instance 1 is ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Instance is Positive
Specific Boundary after 1 Instance is ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Generic Boundary after 1 Instance is [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]

Instance 2 is ['sunny' 'warm' 'high' 'strong' 'warm' 'same']
Instance is Positive
Specific Boundary after 2 Instance is ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after 2 Instance is [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]

Instance 3 is ['rainy' 'cold' 'high' 'strong' 'warm' 'change']
Instance is Negative
Specific Boundary after 3 Instance is ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after 3 Instance is [['sunny', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?', '?'], ['?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?']]


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Instance 4 is  ['sunny' 'warm' 'high' 'strong' 'cool' 'change']
Instance is Positive
Specific Boundary after  4 Instance is  ['sunny' 'warm' '?' 'strong' '?' '?']
Generic Boundary after  4 Instance is  [['sunny', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?'], ['?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?']]
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print("Final Specific_h: ", s_final, sep="\n")
print("Final General_h: ", g_final, sep="\n")
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→ Final Specific_h:
['sunny' 'warm' '?' 'strong' '?' '?']
Final General_h:
[['sunny', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?'], ['?', '?', '?', '?', '?']]
```

