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CANDIDATE ELIMINATION ALGORITHM

**Demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples, where a given set of training data examples stored in a .CSV file**

**Aim:**

To implement and demonstrate the Candidate Elimination Algorithm that finds the set of all hypotheses consistent with given training examples stored in a .CSV file.

**Algorithm:**

1. Initialize specific\_h as the first positive instance and general\_h as the most general hypothesis (?).
2. For each training example in the dataset:  
       🔹 If positive (yes), generalize specific\_h and adjust general\_h accordingly.  
       🔹 If negative (no), specialize general\_h by refining constraints to exclude the instance.
3. Remove redundant hypotheses from general\_h.
4. Output the final specific\_h (most specific hypothesis) and general\_h (set of general hypotheses)

**Program:**

import numpy as np

import pandas as pd

data = pd.read\_csv('E:/2.csv')

concepts = np.array(data.iloc[:, :-1]) # All columns except last

target = np.array(data.iloc[:, -1]) # Last column as target

specific\_h = concepts[0].copy() # Start with first positive instance

general\_h = [["?" for \_ in range(len(specific\_h))] for \_ in range(len(specific\_h))]

print("Initial Specific Hypothesis:", specific\_h)

print("Initial General Hypothesis:", general\_h)

for i, h in enumerate(concepts):

if target[i] == "yes": # Positive example

for x in range(len(specific\_h)):

if h[x] != specific\_h[x]: # Generalize specific\_h

specific\_h[x] = '?'

for g in range(len(general\_h)):

general\_h[g][x] = '?' # Generalize general\_h

elif target[i] == "no": # Negative example

for x in range(len(specific\_h)):

if h[x] != specific\_h[x]: # Specialize general\_h

general\_h[x][x] = specific\_h[x]

indices = [i for i, val in enumerate(general\_h) if val == ['?', '?', '?', '?', '?', '?']]

for i in sorted(indices, reverse=True):

general\_h.pop(i)

print("\nFinal Specific Hypothesis:", specific\_h)

print("Final General Hypothesis:")

for row in general\_h:

print(row)

**2.csv file:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| sky | Airtemp | humidity | wind | water | forcast | enjoysport |
| sunny | warm | normal | strong | warm | same | yes |
| sunny | warm | high | strong | warm | same | yes |
| rainy | cold | high | strong | warm | change | no |
| sunny | warm | high | strong | cool | change | yes |

**Output:**

Initial Specific Hypothesis: ['Sunny' 'Warm' 'Normal' 'Strong' 'Warm' 'Same']

Initial General Hypothesis: [['?', '?', '?', '?', '?', '?'], ..., ['?', '?', '?', '?', '?', '?']]

Final Specific Hypothesis: ['Sunny' 'Warm' '?' 'Strong' '?' '?']

Final General Hypothesis:

['Sunny', '?', '?', '?', '?', '?']

['?', 'Warm', '?', '?', '?', '?']