



VIT[®]
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

LAB REPORT

CSE4020 – MACHINE LEARNING



(B.Tech. COMPUTER SCIENCE AND ENGINEERING)
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VIT – A Place to Learn; A Chance to Grow

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

FIND-S Algorithm

1. Initialize h to the most specific hypothesis in H
2. For each positive training instance x

For each attribute constraint a_i in h

If the constraint a_i is satisfied by x

Then do nothing

Else replace a_i in h by the next more general constraint that is satisfied by x

3. Output hypothesis h

Training Example:

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

PROGRAM –

```
import numpy as np
import pandas as pd
df = pd.read_csv('data.csv')
print("The Given Training Data Set \n")
print(df.to_string(),"\n")
data = np.array(df)[:,:-1]
print("The attributes are-\n",data,"\n")
target_concepts = np.array(df)[:,-1]
print("The target concepts are :",target_concepts,"\n")
hypothesis = ['0' for i in range(len(data[0]))]
print("The initial value of hypothesis :", hypothesis,"\n")
for i in range(len(target_concepts)):
    if target_concepts[i] == 'Yes':
        hypothesis = data[i].copy()
        break
for i in range(len(data)):
    if target_concepts[i] == "Yes":
        for j in range(len(data[i])):
            if data[i][j] != hypothesis[j]:
                hypothesis[j] = '?'
            else:
                continue
        print("For Training Set Example No:",i,"the hypothesis is:
",hypothesis,"\n")
        print()
final_hypothesis = hypothesis.copy()
print("The maximally Specific Hypothesis for a given Training
Examples:",final_hypothesis,"\n")
```

OUTPUT –

The Given Training Data Set

	Sky	Temp	Humid	Wind	Water	Forecast	EnjoySpt
0	Sunny	Warm	Normal	Strong	Warm	Same	Yes
1	Sunny	Warm	High	Strong	Warm	Same	Yes
2	Rainy	Cold	High	Strong	Warm	Change	No
3	Sunny	Warm	High	Strong	Cool	Change	Yes

The attributes 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' ]]
```

The target concepts are : ['Yes' 'Yes' 'No' 'Yes']

The initial value of hypothesis : ['0', '0', '0', '0', '0', '0']

For Training Set Example No: 0 the hypothesis is: ['Sunny' 'Warm' 'Normal' 'Strong' 'Warm' 'Same']

For Training Set Example No: 1 the hypothesis is: ['Sunny' 'Warm' '?' 'Strong' 'Warm' 'Same']

For Training Set Example No: 2 the hypothesis is: ['Sunny' 'Warm' '?' 'Strong' 'Warm' 'Same']

For Training Set Example No: 3 the hypothesis is: ['Sunny' 'Warm' '?' 'Strong' '?' '?']

The maximally Specific Hypothesis for a given Training Examples:
['Sunny' 'Warm' '?' 'Strong' '?' '?']