

Find – S Algorithm

```
import csv
with open(r'C:\Users\Dell\Downloads\enjoysport.csv', 'r') as f:
    reader = csv.reader(f)
    data = list(reader)
print("Training data\n")
for row in data:
    print(row)
```

```
attr_len=len(data[0])-1
h = ['0']*attr_len
print("h=",h)
```

Training data

```
['sky', 'airtemp', 'humidity', 'wind', 'water', 'forecast', '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']
```

The Attributes : ['sky', 'airtemp', 'humidity', 'wind', 'water', 'forecast', 'enjoysport']

The Target Attribute is : enjoysport

Total Attributes = 7

Attribute length = count of attribute - target attribute

Attribute length = 7 - 1

Therefore Attribute length = 6

Step 1 : Initialization

h= ['0', '0', '0', '0', '0', '0']

1st Iteration

Initializing k=0

Taking 1st Row =

['sunny', 'warm', 'normal', 'strong', 'warm', 'same', 'yes']

True

Now the iteration has perform till it encounters "yes"

Here ,

h[0]!='sunny' and h[0] == '0' true h[0]='sunny'

h[1]!='warm' and h[1] == '0' true h[1]='warm'

h[2]!='normal' and h[2] == '0' true h[2]='normal'

h[3]!='strong' and h[3] == '0' true h[3]='strong'

h[4]!='warm' and h[4] == '0' true h[4]='warm'

h[5]!='same' and h[5] == '0' true h[5]='same'

```
k=0
print("\nThe Hypothesis are\n")
for row in data[1:]:
    if row[-1] == 'yes':
        j = 0
        for col in row:
            if col != 'yes':
                if col != h[j] and h[j] == '0':
                    h[j] = col
                elif col != h[j] and h[j] != '0':
                    h[j] = '?'
            j = j + 1
        print("h",k,"=",h)
        k=k+1
print('\nMaximally Specific Hypothesis: \n',"h",k-1,"=", h)
```

h 0 = ['sunny', 'warm', 'normal', 'strong', 'warm', 'same']

2nd Iteration

```
k=0
print("\nThe Hypothesis are\n")
for row in data[1:]:
    if row[-1] == 'yes':
        j = 0
        for col in row:
            if col != 'yes':
                if col != h[j] and h[j] == '0':
                    h[j] = col
                elif col != h[j] and h[j] != '0':
                    h[j] = '?'
            j = j + 1
        print("h",k,"=",h)
        k=k+1
print('\nMaximally Specific Hypothesis: \n',"h",k-1,"=", h)
```

Taking 2nd Row =

['sunny', 'warm', 'high', 'strong', 'warm', 'same', 'yes']

True

Now the iteration has perform till it encounters "yes"

Remember the first condition holds good for the first initialization of values to hypothesis(i.e h0[]) which is only for first row of data set

This condition comes in to picture only when there is difference in the values of hypothesis and value of the row it encounters

Having h[2]= 'normal'

h[2]!='high' and h[2]!=0 true h[2]='?'

The remaining hypothesis is left as it is... B'cos the conditions above doesn't satisfy

h[0] = 'sunny'
h[1] = 'warm'
h[3] = 'strong'
h[4] = 'warm'
h[5] = 'same'

h 1 = ['sunny', 'warm', '?', 'strong', 'warm', 'same']

3rd Iteration

```
k=0
print("\nThe Hypothesis are\n")
for row in data[1:]:
    if row[-1] == 'yes':
        j = 0
        for col in row:
            if col != 'yes':
                if col != h[j] and h[j] == '0':
                    h[j] = col
                elif col != h[j] and h[j] != '0':
                    h[j] = '?'
            j = j + 1
        print("h",k,"=",h)
        k=k+1
print('\nMaximally Specific Hypothesis: \n',"h",k-1,"=", h)
```

Taking 3rd Row =

['rainy', 'cold', 'high', 'strong', 'warm', 'change', 'no']

False

So the hypothesis remains same without changing

h 2 = ['sunny', 'warm', '?', 'strong', 'warm', 'same']

4th Iteration

```
k=0
print("\nThe Hypothesis are\n")
for row in data[1:]:
    if row[-1] == 'yes':
        j = 0
        for col in row:
            if col != 'yes':
                if col != h[j] and h[j] == '0':
                    h[j] = col
                elif col != h[j] and h[j] != '0':
                    h[j] = '?'
            j = j + 1
        print("h",k,"=",h)
        k=k+1
print('\nMaximally Specific Hypothesis: \n',"h",k-1,"=", h)
```

Taking 3rd Row =

['sunny', 'warm', 'high', 'strong', 'cool', 'change', 'yes']

True

Now after proving the first condition as False moves to second condition

Having h[4]= 'warm'

h[4]!='cool' and h[4]!='0' true h[4]='?'

Having h[5]= 'same'

h[5]!='change' and h[5]!='0' true h[5]='?'

```

k=0
print("\nThe Hypothesis are\n")
for row in data[1:]:
    if row[-1] == 'yes':
        j = 0
        for col in row:
            if col != 'yes':
                if col != h[j] and h[j] == '0':
                    h[j] = col
                elif col != h[j] and h[j] != '0':
                    h[j] = '?'
            j = j + 1
        print("h",k,"=",h)
        k=k+1
print('\nMaximally Specific Hypothesis: \n',"h",k-1,"=", h)

```

Remaining hypothesis values remains same as

h[0] = 'sunny'

h[1] = 'warm'

h[2] = '?'

h[3] = 'strong'

h 3 = ['sunny', 'warm', '?', 'strong', '?', '?']

After completing the dataset we got the final hypothesis as

h 3 = ['sunny', 'warm', '?', 'strong', '?', '?']