# EXPERIMENT 3:

```
import math

data = [
 ['Sunny','Hot','High','Weak','No'],
 ['Sunny','Hot','High','Strong','No'],
 ['Overcast','Hot','High','Weak','Yes'],
 ['Rain','Mild','High','Weak','Yes'],
 ['Rain','Cool','Normal','Weak','Yes'],
 ['Rain','Cool','Normal','Strong','No']
]

attrs = ['Outlook','Temp','Humidity','Wind']

def ent(d):  y = sum(1 for r in d if
r[-1]=='Yes')  n = len(d)-y  if y==0
or n==0: return 0
 return -(y/len(d))*math.log2(y/len(d))-(n/len(d))*math.log2(n/len(d))

def gain(d,i):
 return ent(d)-sum(len([r for r in d if r[i]==v])/len(d)*ent([r for r in d if r[i]==v]) for v in set(r[i]
for r in d))

def id3(d,a):
 l=[r[-1] for r in d]
 if l.count(l[0])==len(l): return l[0]
i=max(range(len(a)),key=lambda x:gain(d,x))
t={a[i]:{}}  for v in set(r[i] for r in d):
t[a[i]][v]=id3([r[:i]+r[i+1:] for r in d if
r[i]==v],a[:i]+a[i+1:])  return t
```

```
tree=id3(data,attrs) print("Tree:",tree)

sample=['Sunny','Cool','High','Strong'] def
test(t,a,s):
 return t if type(t)==str else test(t[list(t)[0]][s[a.index(list(t)[0])]],a,s)

print("Result:",test(tree,attrs,sample))
```