25/5/21

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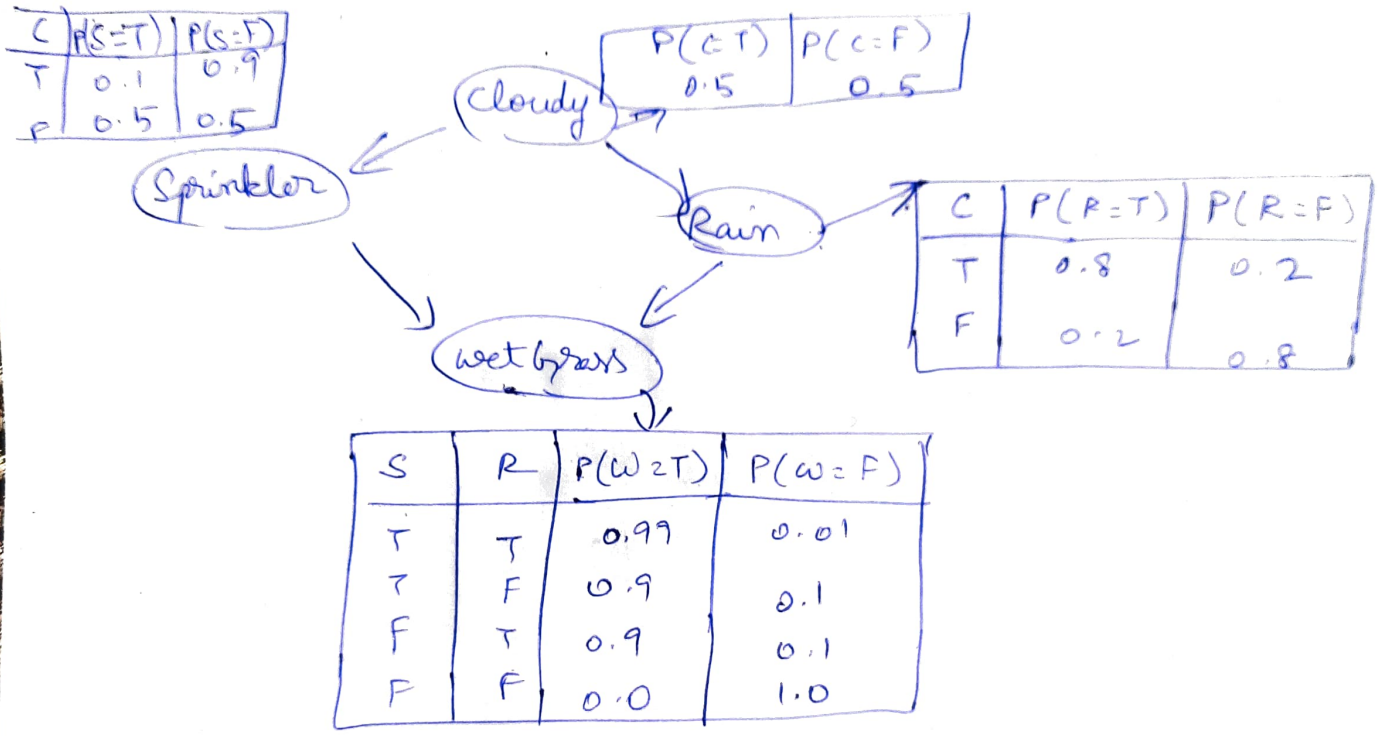
ML Lab Test - 1

Q. Given the following Bayesian Network
Find P(Sprinkler, wetGrass | Cloudy)



S	R	P(W=T)	P(W=F)
T	T	0.99	0.01
T	F	0.9	0.1
F	T	0.9	0.1
F	F	0.0	1.0

CODE :

```
from pomegranate import *
import numpy as np
Cloudy = DiscreteDistribution ({"Yes": 0.5, "No": 0.5})
Sprinkler = ConditionalProbability ([ ["Yes", "On", 0.1],
                                      ["No", "On", 0.5],
                                      ["Yes", "off", 0.9],
                                      ["No", "off", 0.5] ],
                                      [Cloudy]
)
```

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```
Rain = ConditionalProbability([ ["Yes","Yes",0.8],
                                ["No","Yes",0.2],
                                ["Yes","No",0.2],
                                ["No","No",0.8]],
                              [Cloudy])

)

wetgrass = ConditionalProbability([
    ["On","Yes","Wet",0.99],["On","No","Wet",0.9],
    ["Off","Yes","Wet",0.9],["Off","No","Wet",0.08],
    ["On","Yes","Dry",0.01],["On","No","Dry",0.1],
    ["Off","Yes","Dry",0.1],["Off","No","Dry",1.0]],
    [Sprinkles, Rain])
```

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```
sCloudy = Node(Cloudy, name = "Cloudy")
sRain = Node(Rain, name = "Rain")
sSprinkler = Node(Sprinkler, name = "Sprinkler")
sWetGrass = Node(WetGrass, name = "WetGrass")

model = BayesianNetwork("Weather and Grass")
model.add_nodes(sCloudy, sRain, sSprinkler, sWetGrass)
model.add_edge(sCloudy, sSprinkler)
model.add_edge(sCloudy, sRain)
model.add_edge(sSprinkler, sWetGrass)
model.add_edge(sRain, sWetGrass)
model.bake()

arr = np.array([["On", "Wet", "Yes"]], ndmin=2)
ans = np.e ** model.log_probability(arr)
print(ans)
```