**Implemenation :**

pip install pgmpy

from pgmpy.models import BayesianNetwork

from pgmpy.factors.discrete import TabularCPD as tbcpd

from pgmpy.inference import VariableElimination

BN\_alarm = BayesianNetwork([

("Burglary", "Alarm"),

("Earthquake", "Alarm"),

("Alarm", "JohnCall"),

("Alarm", "MaryCall"),

])

PD\_burg = tbcpd("Burglary", 2, [[0.999], [0.001]])

PD\_eq = tbcpd("Earthquake", 2, [[0.998], [0.002]])

PD\_alrm = tbcpd("Alarm", 2,[[0.999, 0.71, 0.06, 0.05],[0.001, 0.29, 0.94, 0.95]],evidence=["Burglary", "Earthquake"],evidence\_card=[2, 2])

PD\_jony = tbcpd("JohnCall", 2, [[0.95, 0.1], [0.05, 0.9]], evidence=["Alarm"], evidence\_card=[2])

PD\_mary = tbcpd("MaryCall", 2, [[0.99, 0.3], [0.01, 0.7]], evidence=["Alarm"], evidence\_card=[2])

BN\_alarm.add\_cpds(PD\_burg, PD\_eq, PD\_alrm, PD\_jony, PD\_mary)

qry = VariableElimination(BN\_alarm)

res1 = qry.query(variables=["JohnCall", "MaryCall", "Alarm"], evidence={"Burglary": 0, "Earthquake": 0})

res2 = qry.query(variables=["JohnCall"], evidence={"Burglary": 0, "Earthquake": 0})

res3 = qry.query(variables=["Burglary"], evidence={"JohnCall": 1, "MaryCall": 1})

print(f"Nodes in the Bayesian Network are : {BN\_alarm.nodes()} \n")

print(f"Edges in the Bayesian Network are : {BN\_alarm.edges()} \n")

print("Local independencies for JohnCall:", BN\_alarm.local\_independencies("JohnCall"))

print("Local independencies for MarryCall:", BN\_alarm.local\_independencies("MaryCall"))

for i in [[PD\_alrm,"Prob\_dist of alarm"], [PD\_jony,"Prob\_dist of Jony Calls"], [PD\_mary,"Prob\_dist of Mary Calls"], [PD\_eq,"Prob\_dist of Earthquake"], [PD\_burg,"Prob\_dist of Burglary"]]:

print(i[1])

print(i[0])

print(f"""

->Probabilities of John Calling and Mary Calling given Alarm sounded :\n {res1} \n

->Probabilities of John Calling given No Burglary and No Earthquake : \n {res2} \n

->Probabilities of Burglary given John Calling and Mary Calling : \n {res3} \n

""")

**Output:**



