

```

In [3]: import math
from pomegranate import *
# Initially the door selected by the guest is completely random
guest = DiscreteDistribution( { 'A': 1./3, 'B': 1./3, 'C': 1./3 } )
# The door containing the prize is also a random process
prize = DiscreteDistribution( { 'A': 1./3, 'B': 1./3, 'C': 1./3 } )
# The door Monty picks, depends on the choice of the guest and the prize door
monty = ConditionalProbabilityTable(
[[ 'A', 'A', 'A', 0.0 ],
[ 'A', 'A', 'B', 0.5 ],
[ 'A', 'A', 'C', 0.5 ],
[ 'A', 'B', 'A', 0.0 ],
[ 'A', 'B', 'B', 0.0 ],
[ 'A', 'B', 'C', 1.0 ],
[ 'A', 'C', 'A', 0.0 ],
[ 'A', 'C', 'B', 1.0 ],
[ 'A', 'C', 'C', 0.0 ],
[ 'B', 'A', 'A', 0.0 ],
[ 'B', 'A', 'B', 0.0 ],
[ 'B', 'A', 'C', 1.0 ],
[ 'B', 'B', 'A', 0.5 ],
[ 'B', 'B', 'B', 0.0 ],
[ 'B', 'B', 'C', 0.5 ],
[ 'B', 'C', 'A', 1.0 ],
[ 'B', 'C', 'B', 0.0 ],
[ 'B', 'C', 'C', 0.0 ],
[ 'C', 'A', 'A', 0.0 ],
[ 'C', 'A', 'B', 1.0 ],
[ 'C', 'A', 'C', 0.0 ],
[ 'C', 'B', 'A', 1.0 ],
[ 'C', 'B', 'B', 0.0 ],
[ 'C', 'B', 'C', 0.0 ],
[ 'C', 'C', 'A', 0.5 ],
[ 'C', 'C', 'B', 0.5 ],
[ 'C', 'C', 'C', 0.0 ]], [guest, prize] )

d1 = State( guest, name="guest" )
d2 = State( prize, name="prize" )
d3 = State( monty, name="monty" )
#Building the Bayesian Network
network = BayesianNetwork( "Solving the Monty Hall Problem With Bayesian Network" )
network.add_states(d1, d2, d3)
network.add_edge(d1, d3)
network.add_edge(d2, d3)
network.bake()
print("***Model with only Guest selects Door A***")
beliefs = network.predict_proba({ 'guest' : 'A' })
beliefs = map(str, beliefs)
print("\n".join( "{}\t{}".format( state.name, belief ) for state, belief in zip(
beliefs ) ))
print("\n\n***Model with Guest selects Door A and Monty selects Door B***")
beliefs = network.predict_proba({'guest' : 'A', 'monty' : 'B'})
print("\n".join( "{}\t{}".format( state.name, str(belief) ) for state, belief in
network.states, beliefs )))

```

\*\*\*Model with only Guest selects Door A\*\*\*

```

guest    A
prize    {
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "A" : 0.3333333333333333,
            "B" : 0.3333333333333333,
            "C" : 0.3333333333333333
        }
    ],
    "frozen" : false
}
monty    {
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "B" : 0.49999999999999983,
            "A" : 0.0,
            "C" : 0.49999999999999983
        }
    ],
    "frozen" : false
}

```

\*\*\*Model with Guest selects Door A and Monty selects Door B\*\*\*

```

guest    A
prize    {
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "A" : 0.3333333333333334,
            "B" : 0.0,
            "C" : 0.6666666666666664
        }
    ],
    "frozen" : false
}
monty    B

```

In [ ]: