AI LAB Ex – 10:- Beysian Belief

Team Members:

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- ✓ Anannya - 367
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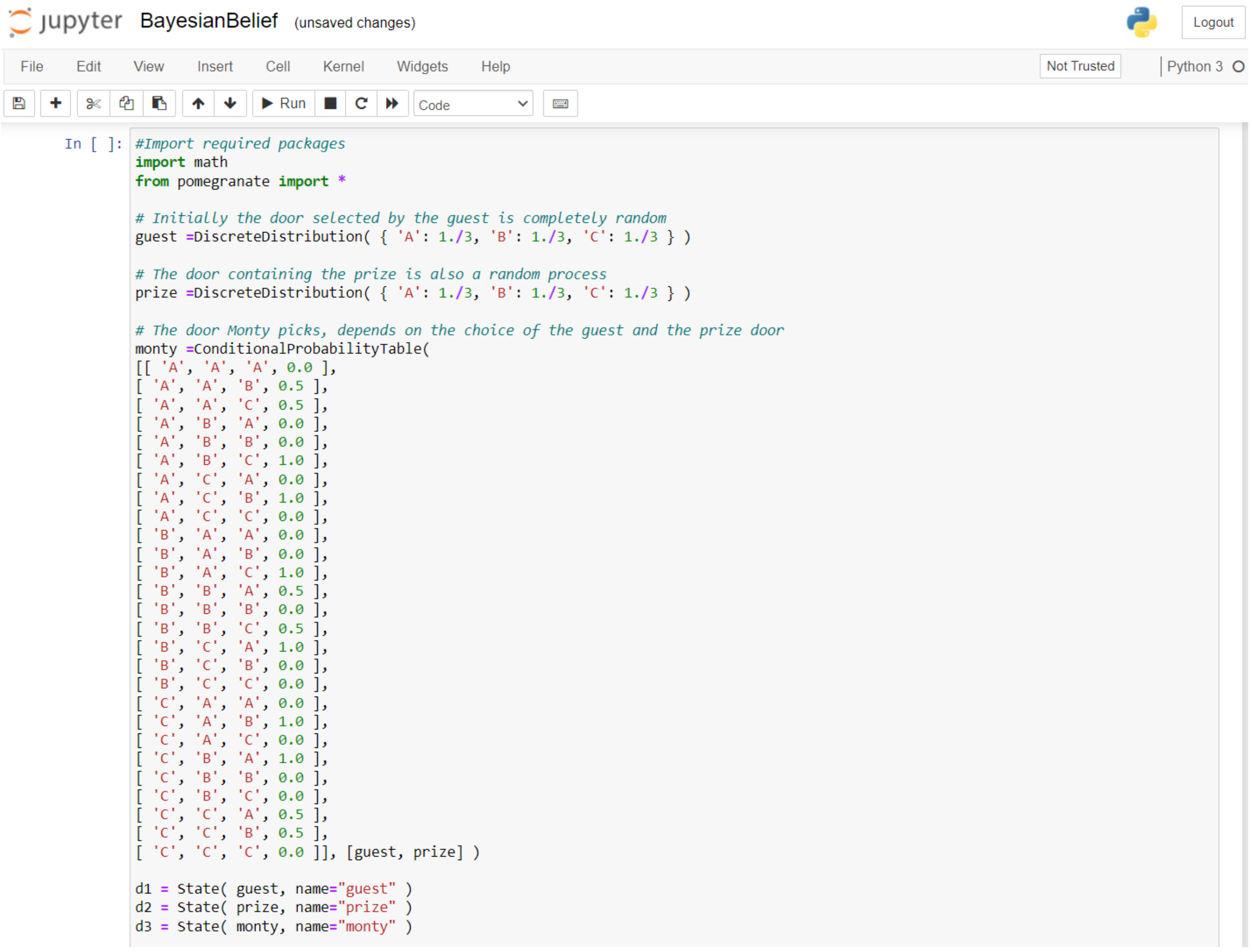
Aim:

To study the implementation of Beysian Belief.

Code and Execution-

```
#Import required packages
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 Networks" )
network.add_states(d1, d2, d3)
network.add_edge(d1, d3)
network.add_edge(d2, d3)
network.bake()

beliefs = network.predict_proba({'guest' : 'A', 'monty' : 'B'})
print("n".join( "{}t{}".format( state.name, str(belief) ) for state, belief in zip( network.states, beliefs )))

beliefs = network.predict_proba({ 'guest' : 'A' })
beliefs = map(str, beliefs)
print("n".join( "{}t{}".format( state.name, belief ) for state, belief in zip( network.states, beliefs ) ))
```



```
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# The door containing the prize is also a random process
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# 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" )
```
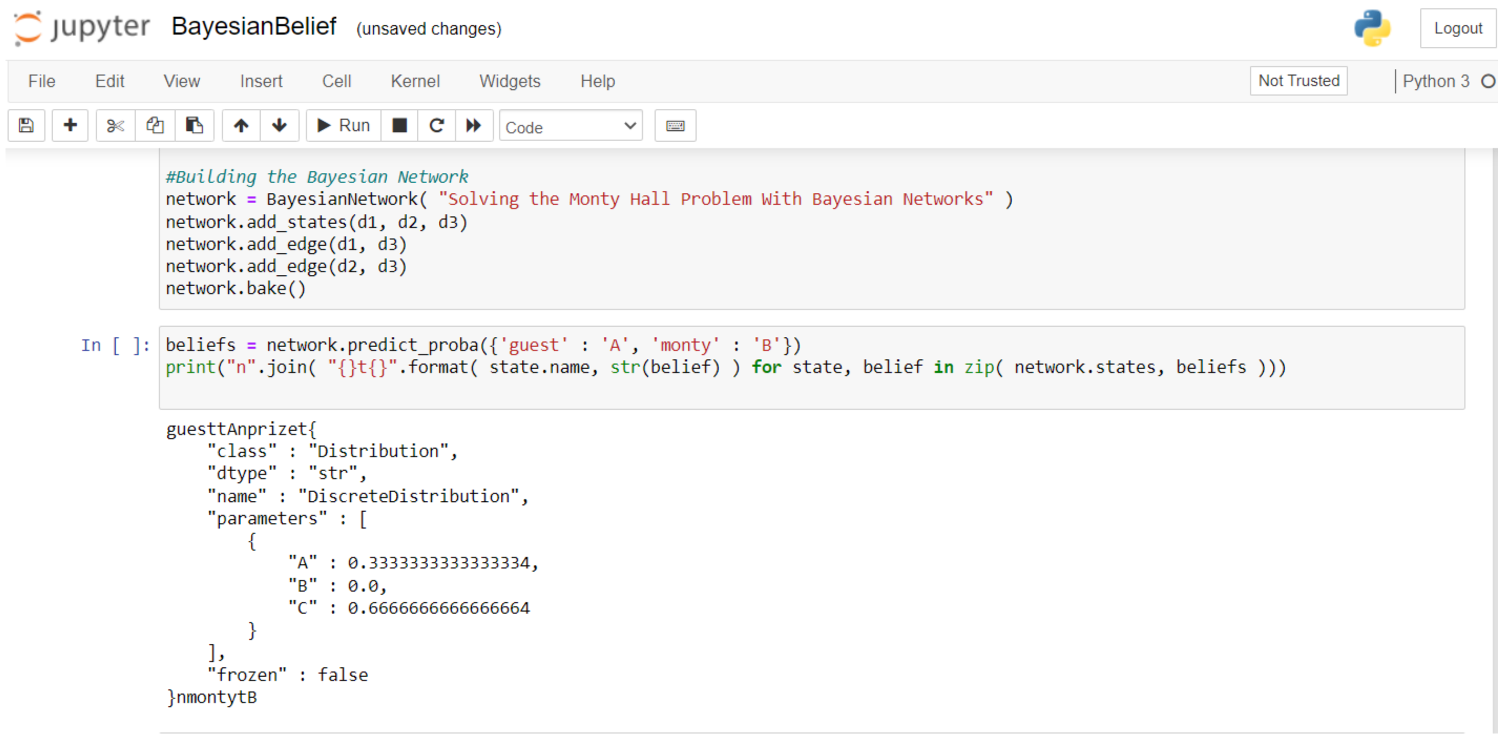



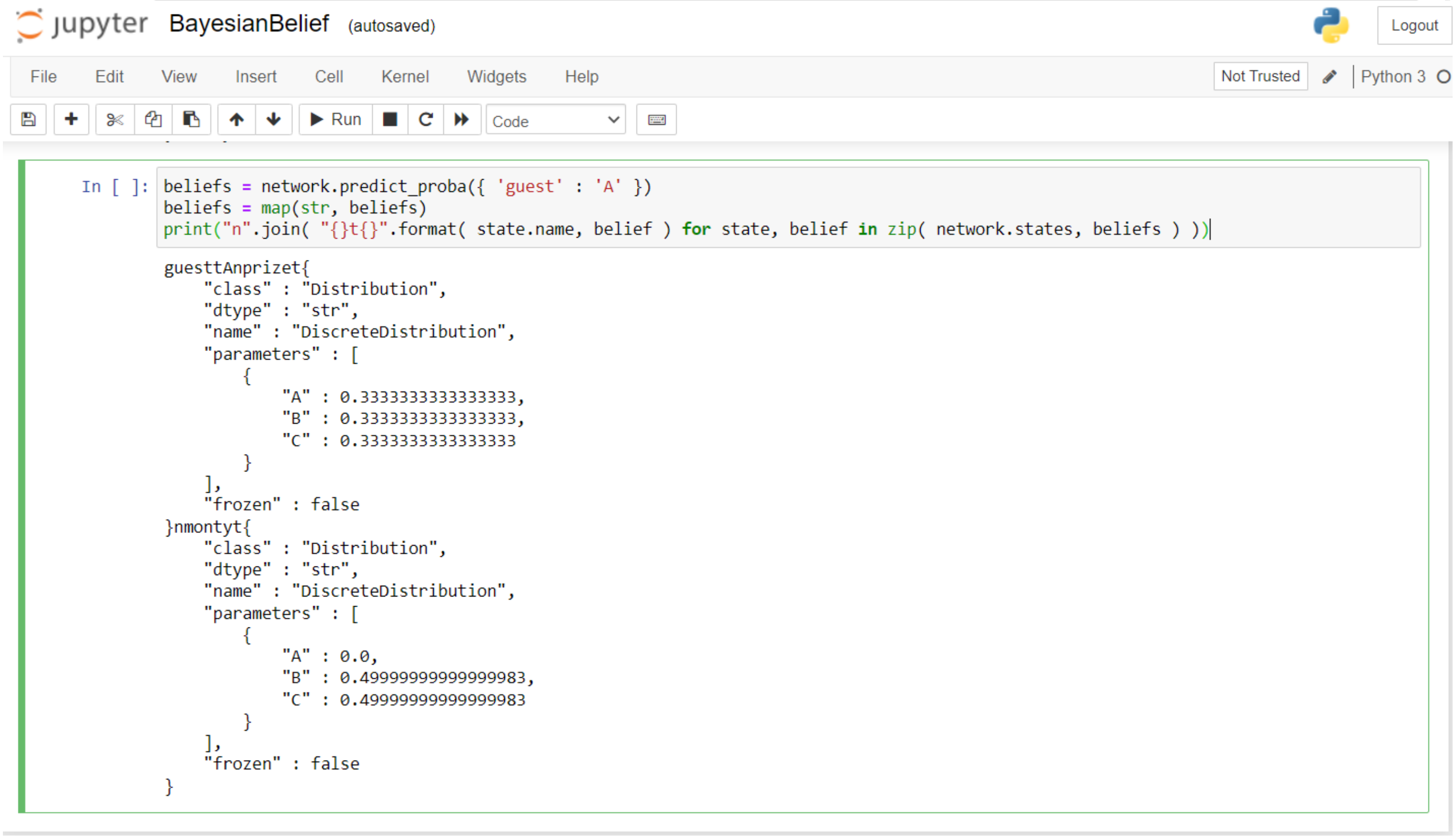
jupyter BayesianBelief (unsaved changes)

```
#Building the Bayesian Network
network = BayesianNetwork( "Solving the Monty Hall Problem With Bayesian Networks" )
network.add_states(d1, d2, d3)
network.add_edge(d1, d3)
network.add_edge(d2, d3)
network.bake()
```

In [ ]:

```
beliefs = network.predict_proba({'guest' : 'A', 'monty' : 'B'})
print("n".join( "{}t{}".format( state.name, str(belief) ) for state, belief in zip( network.states, beliefs )))
```

```
guesttAnprizet{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "A" : 0.3333333333333334,
            "B" : 0.0,
            "C" : 0.6666666666666664
        }
    ],
    "frozen" : false
}nmontytB
```



jupyter BayesianBelief (autosaved)

In [ ]:

```
beliefs = network.predict_proba({ 'guest' : 'A' })
beliefs = map(str, beliefs)
print("n".join( "{}t{}".format( state.name, belief ) for state, belief in zip( network.states, beliefs ) ))
```

```
guesttAnprizet{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "A" : 0.3333333333333333,
            "B" : 0.3333333333333333,
            "C" : 0.3333333333333333
        }
    ],
    "frozen" : false
}nmontyt{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "DiscreteDistribution",
    "parameters" : [
        {
            "A" : 0.0,
            "B" : 0.49999999999999983,
            "C" : 0.49999999999999983
        }
    ],
    "frozen" : false
}
```