ConditionalProbabilitySolution

December 20, 2016

1 Conditional Probability Solution

First we'll modify the code to have some fixed purchase probability regardless of age, say 40%:

```
In [8]: from numpy import random
        random.seed(0)

        totals = {20:0, 30:0, 40:0, 50:0, 60:0, 70:0}
        purchases = {20:0, 30:0, 40:0, 50:0, 60:0, 70:0}
        totalPurchases = 0
        for _ in range(100000):
            ageDecade = random.choice([20, 30, 40, 50, 60, 70])
            purchaseProbability = 0.4
            totals[ageDecade] += 1
            if (random.random() < purchaseProbability):     #if random.random() is less than 0.4
                totalPurchases += 1
                purchases[ageDecade] += 1
```

```
In [9]: totals
```

```
Out[9]: {20: 16576, 30: 16619, 40: 16632, 50: 16805, 60: 16664, 70: 16704}
```

```
In [10]: purchases    #around 40% of totals
```

```
Out[10]: {20: 6710, 30: 6627, 40: 6670, 50: 6665, 60: 6638, 70: 6720}
```

```
In [11]: totalPurchases
```

```
Out[11]: 40030
```

Next we will compute P(E|F) for some age group, let's pick 30 year olds again:

```
In [12]: PEF = float(purchases[30]) / float(totals[30])
         print("P(purchase | 30s): " + str(PEF))
```

```
P(purchase | 30s): 0.3987604549010169
```

Now we'll compute P(E)

```
In [13]: PE = float(totalPurchases) / 100000.0
         print("P(Purchase):" + str(PE))
```

```
P(Purchase):0.4003
```

P(E|F) is pretty darn close to P(E), so we can say that E and F are likely indepedent variables.

```
In [14]: PEF60 = float(purchases[60]) / float(totals[60])
         print("P(purchase | 60s): " + str(PEF60))
```

```
P(purchase | 60s): 0.3983437349975996
```

```
In [ ]:
```