Axioms of Probability

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1. For any event E, $0 \leq P(E) \leq 1$

2. For Sample Space, P (S) = 1

3. $P(A \cup B) = P(A) + P(B)$ for mutually disjoint events.
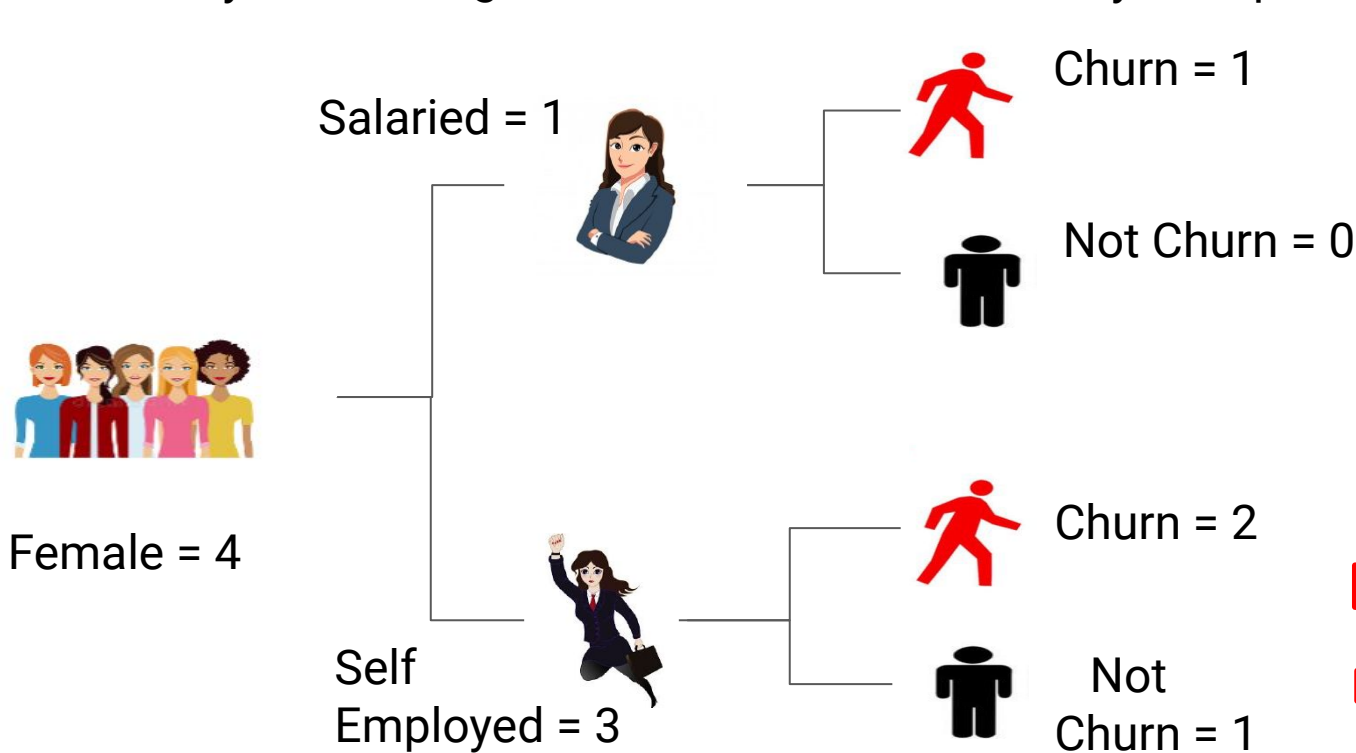
Axiom 1 : Probability of Event

- For any event E, $0 \leq P(E) \leq 1$

$$P(event) = \frac{count\ of\ outcomes\ in\ Event}{count\ of\ outcomes\ in\ Sample\ Space}$$

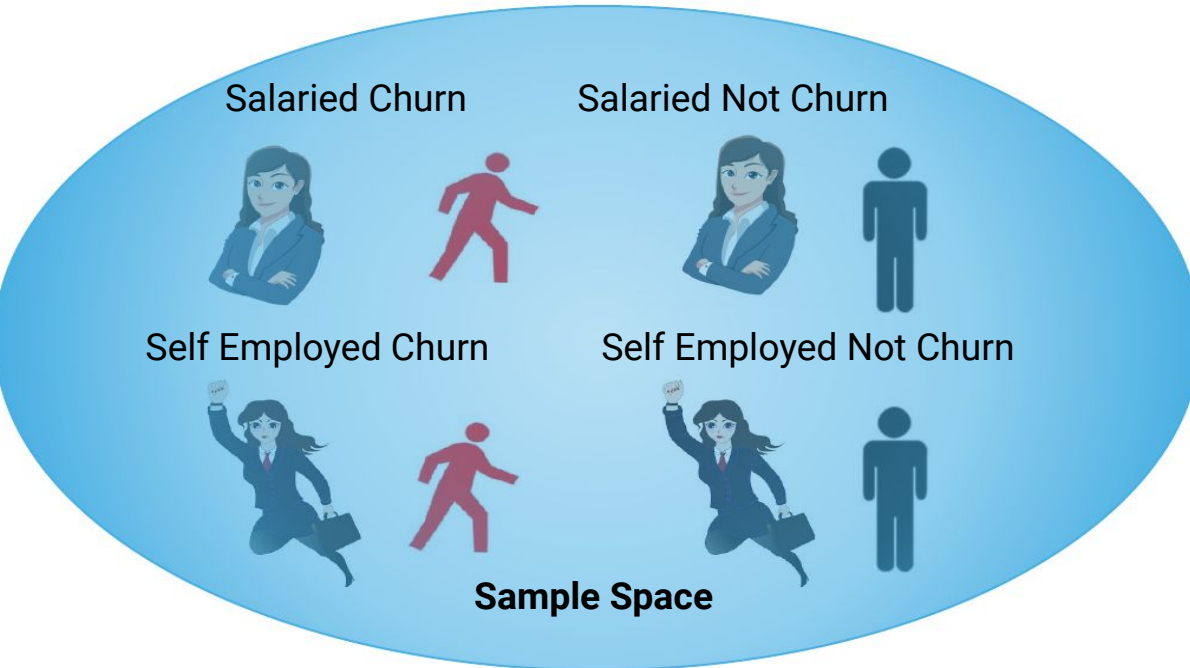# Axiom 2 : Probability of Sample Space

- For Sample Space, P (S) = 1

Ex. Probability of churning status of female customer by their profession ?

|	gender	age	occupation	churn
0	Male	young	salaried	0
1	Male	young	self_employed	0
2	Male	old	self_employed	0
3	Male	young	self_employed	0
4	Female	young	salaried	1
5	Male	old	salaried	0
6	Female	young	self_employed	1
7	Male	young	self_employed	0
8	Male	young	salaried	1
9	Male	young	salaried	0
10	Male	young	self_employed	1
11	Female	young	self_employed	1
12	Male	young	retired	0
13	Female	young	self_employed	0
14	Male	old	self_employed	

Axiom 2 : Probability of Sample Space

Ex. Probability of churning status of female customer by their profession ?

Axiom 2 : Probability of Sample Space

Ex. Probability of churning status of female customer by their profession ?

Salaried Churn =1   Salaried Not Churn = 0

Self Employed Churn =2   Self Employed Not Churn = 1
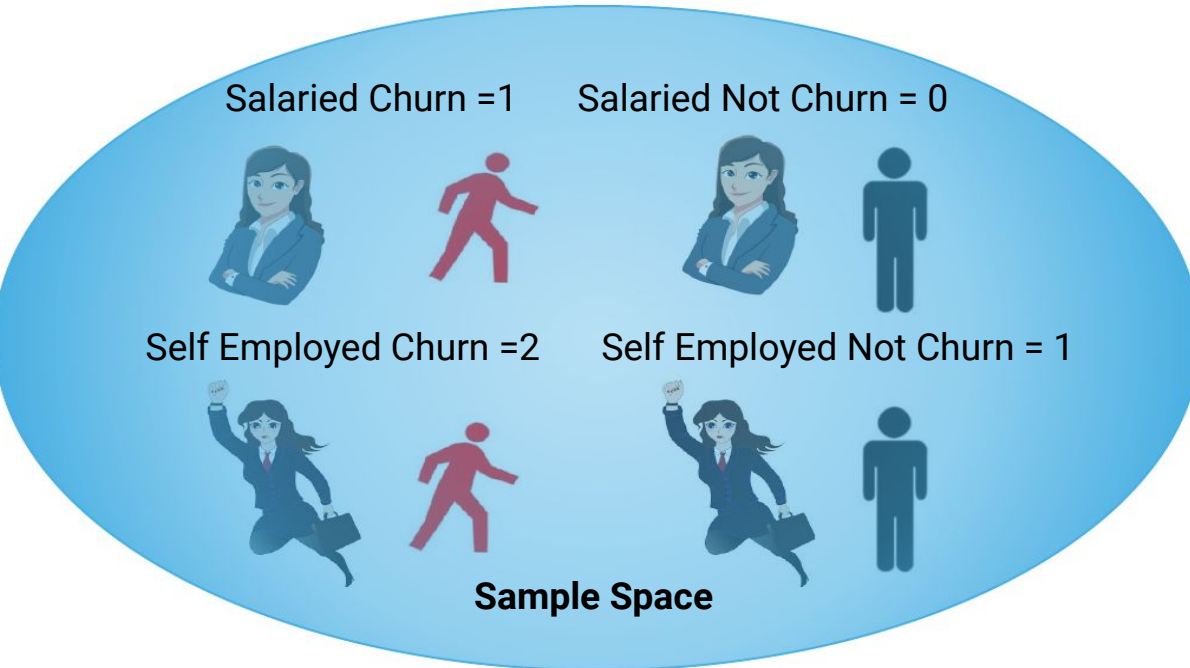
Sample Space

P (Salaried Churn) = ¼ → 0.25

P(Salaried Not Churn) = 0 → 0

P(Self Employed Churn)= ½ → 0.5

P(Self Employed Not Churn) = ¼ → 0.25

P(Sample Space)
= 0.25 + 0 + 0.5 + .25 = 1

Axiom 3 : Mutually Exclusive Event

- P (A $\cup$ B) = P(A) + P(B) for mutually exclusive events

Mutually Exclusive Events : Two events, A and B are said to be mutually exclusive if they can not occur together (have no common elements)

$$P(A \cap B) = 0$$

Axiom 3 : Mutually Exclusive Event

Event A : Getting a number greater than 4 rolling a dice.

Event B : Getting a number less than 3 rolling a dice.

Axiom 3 : Mutually Exclusive Event

Event A : Getting a number greater than 4 rolling a dice.

Event B : Getting a number less than 3 rolling a dice.

Event A^c : Getting a number less than or equal to 4 on rolling a dice.
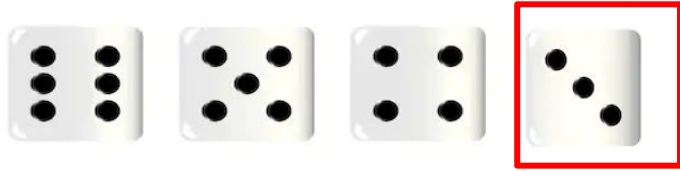
Mutually Exhaustive Event

Mutually exhaustive means that the events together make up everything that can possibly happen
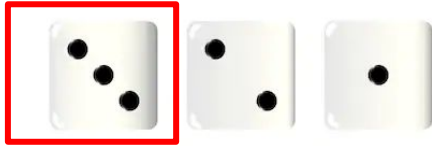
$$P\left(\bigcup E^n_{i=1}\right) = S$$

Mutually Exhaustive Event

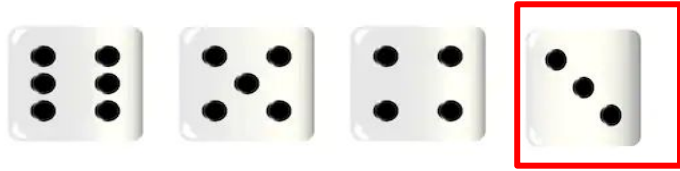Event A : Getting a number greater than 2 rolling a dice.

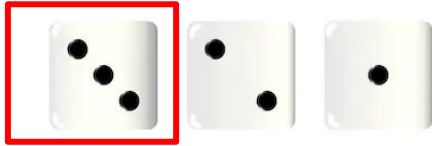Event B : Getting a number less than 4 rolling a dice

Mutually Exhaustive Event

Event A : Getting a number greater than 2 rolling a dice.

Event B : Getting a number less than 4 rolling a dice

Event C : Getting a number less than 3 rolling a dice

Thank You!

Axioms of Probability

1. For any event E, $0 \leq P(E) \leq 1$

2. For Sample Space, $P(S) = 1$

3. $P(A \cup B) = P(A) + P(B)$ for mutually disjoint events. $(A \cap B = 0)$

   Mutually disjoint (can not both occur at once), mutually exclusive, have no elements in common.