Handling missing Value ¶

- **Delete the record missing value**
- **Statistical methods Mean, Meadian, or Mode**
- **Create seprate model that handle missing value**
- **Forward / Backward fillng**

In [3]:
```
import pandas as pd
import numpy as np
```

Method 1 applied :- *remove missing value row*

In [4]:
```
dict = {"f1":[-17,-21,26,35,45],"f2":[5,25,np.nan,66,54],"f3":[105,130,np.nan,168,199]}
```

In [5]:
```
df1 = pd.DataFrame(data=dict)
```

In [6]:
```
df1
```

Out[6]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	NaN	NaN
3	35	66.0	168.0
4	45	54.0	199.0

In [7]:
```
df1.isnull().sum()
```

Out[7]:
```
f1    0
f2    1
f3    1
dtype: int64
```

In [8]:
```
# In a row "2" most of the values are missing.So, these types if missing values we can remove
# but only when we have huge data set
```

In [9]:
```
df1.dropna(axis=0)
```

Out[9]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
3	35	66.0	168.0
4	45	54.0	199.0

Method 2 :- *Statistical Method -Mode, Median , Mean*

In [10]:
```
df1['f3'].fillna(value = df1.f3.mode())
```

Out[10]:
```
0    105.0
1    130.0
2    168.0
3    168.0
4    199.0
Name: f3, dtype: float64
```

In [11]:
```
df1['f3'].fillna(value = df1.f3.median())
```

Out[11]:
```
0    105.0
1    130.0
2    149.0
3    168.0
4    199.0
Name: f3, dtype: float64
```

In [12]:
```
df1['f3'].fillna(value = df1.f3.mean(),inplace=True)
```

In [13]:
```
df1 # filled with mean
```

Out[13]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	NaN	150.5
3	35	66.0	168.0
4	45	54.0	199.0

Method 3 :- *Machine learning model - Linear Regression*

In [14]:
```
from sklearn.linear_model import LinearRegression
```

In [15]:
```
model = LinearRegression()
```

In [16]:
```
X = df1[["f1","f3"]]
```

In [17]:
```
X
```

Out[17]:

	f1	f3
0	-17	105.0
1	-21	130.0
2	26	150.5
3	35	168.0
4	45	199.0

In [18]:
```
y = df1.f2
```

In [19]:
```
y
```

Out[19]:
```
0     5.0
1    25.0
2     NaN
3    66.0
4    54.0
Name: f2, dtype: float64
```

In [20]:
```
X_train = X.drop(index=2)
```

In [21]:
```
X_train
```

Out[21]:

	f1	f3
0	-17	105.0
1	-21	130.0
3	35	168.0
4	45	199.0

In [22]:
```
y_train = y.drop(index = 2)
```

In [23]:
```
y_train
```

Out[23]:
```
0     5.0
1    25.0
3    66.0
4    54.0
Name: f2, dtype: float64
```

In [24]:
```
X_test = X.iloc[2:3,:]
```

In [25]:
```
X_test
```

Out[25]:

	f1	f3
2	26	150.5

In [26]:
```
model.fit(X_train,y_train)
```

Out[26]:
```
LinearRegression()
```

In [27]:
```
model.predict(X_test) # so we can fill Null value with this pridicted value
```

Out[27]:
```
array([44.60766642])
```

In [28]:
```
df1.fillna(np.round(model.predict(X_test)[0],decimals=0))
```

Out[28]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	45.0	150.5
3	35	66.0	168.0
4	45	54.0	199.0

Method 4 :- *forward fill/backward fill*

In [29]:
```
df1
```

Out[29]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	NaN	150.5
3	35	66.0	168.0
4	45	54.0	199.0

In [30]:
```
df1.ffill()
```

Out[30]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	25.0	150.5
3	35	66.0	168.0
4	45	54.0	199.0

In [31]:
```
df1.bfill()
```

Out[31]:

	f1	f2	f3
0	-17	5.0	105.0
1	-21	25.0	130.0
2	26	66.0	150.5
3	35	66.0	168.0
4	45	54.0	199.0

In [ ]:

In [ ]:

In [ ]:

In [71]:
```
df = pd.read_csv(r'D:\\INEURONE\\DATASET\\Titanic\\train.csv')
```

In [72]:
```
df.head()
```

Out[72]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [80]:
```
1 df.isnull().sum()
```

Out[80]:
```
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

In [79]:
```
1 (df.isnull().sum()/len(df))*100  # these are the percentage off missing value
```

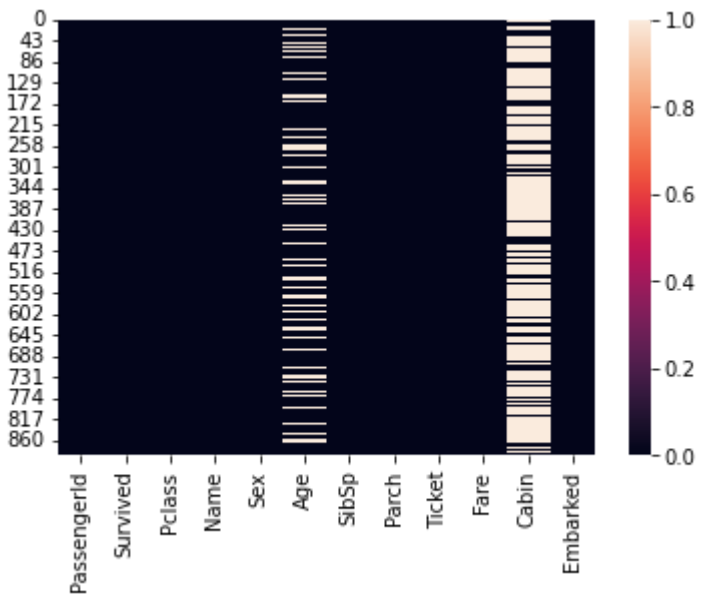
Out[79]:
```
PassengerId     0.000000
Survived        0.000000
Pclass          0.000000
Name            0.000000
Sex             0.000000
Age            19.865320
SibSp           0.000000
Parch           0.000000
Ticket          0.000000
Fare            0.000000
Cabin          77.104377
Embarked        0.224467
dtype: float64
```

In [76]:
```
1 df.shape
```

Out[76]: (891, 12)

In [107]:
```
1 sns.heatmap(df.isnull())
```

Out[107]: <AxesSubplot:>

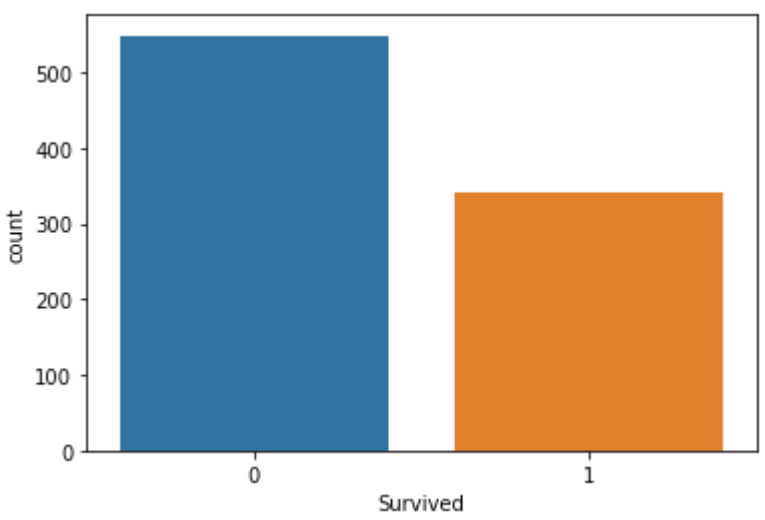


we can see age and cabin has missing values. In which Age missing values are low , So we can replace it wiith some standard method . But Cabin column has so many missing values , so there is no use of that column. therefore we can drop it

In [86]:
```
1 import seaborn as sns
2 import matplotlib as plt
3 import  warnings
4 warnings.filterwarnings('ignore')
```

In [111]:
```
1 sns.countplot(x= df.Survived)
```

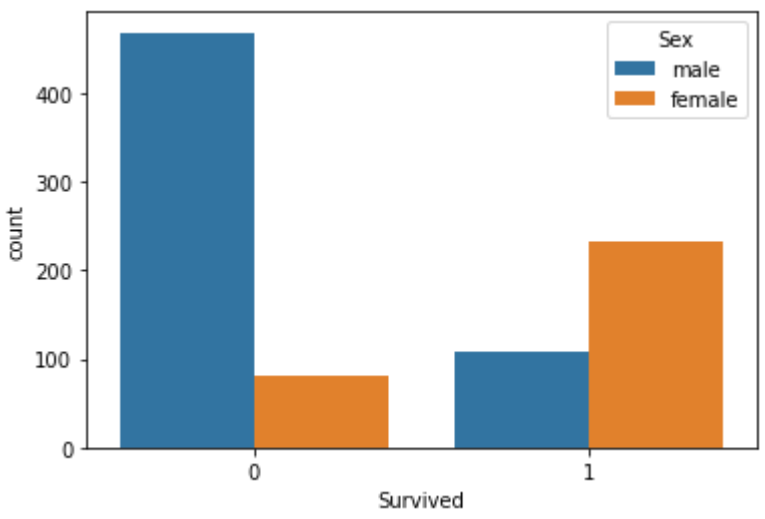
Out[111]: <AxesSubplot:xlabel='Survived', ylabel='count'>



- **not survived people are more**

In [113]:
```
1 sns.countplot(x= df.Survived,hue= df.Sex)
```

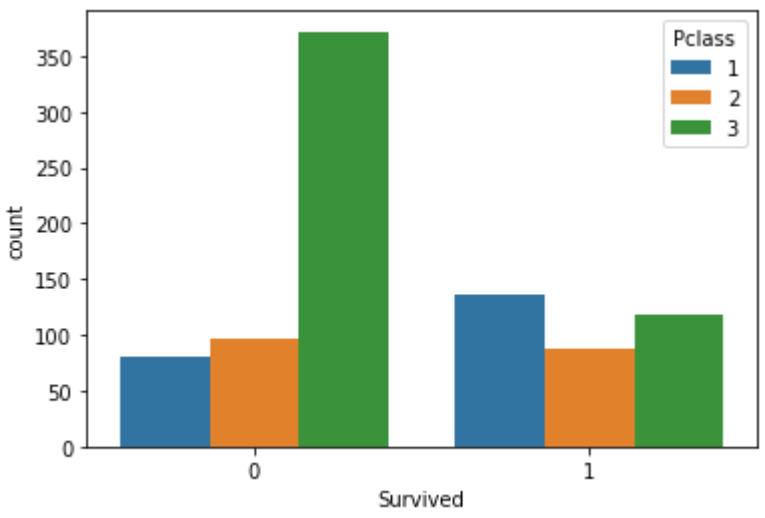
Out[113]: <AxesSubplot:xlabel='Survived', ylabel='count'>



- **this shows that most of the female got survived as compare to male**

In [114]:
```
1 sns.countplot(x= df.Survived,hue= df.Pclass)
```

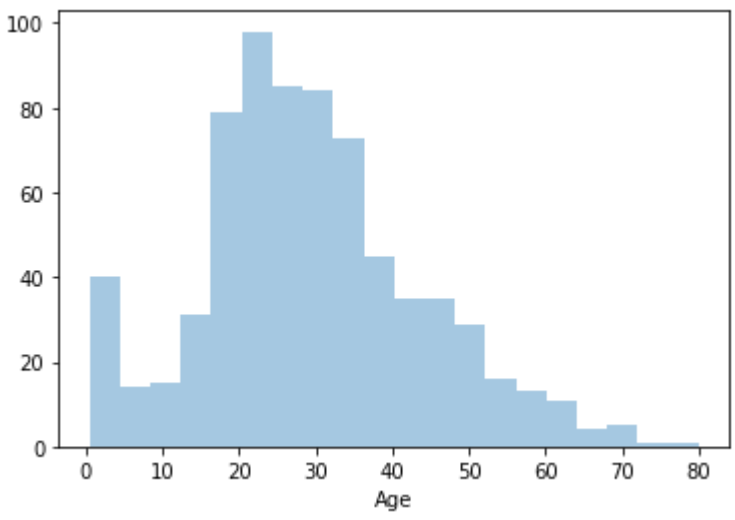
Out[114]: <AxesSubplot:xlabel='Survived', ylabel='count'>



- **people from 3rd class not survived as compare to 2nd and 1st**

In [119]:
```
1 sns.distplot(df.Age,kde=False)
```

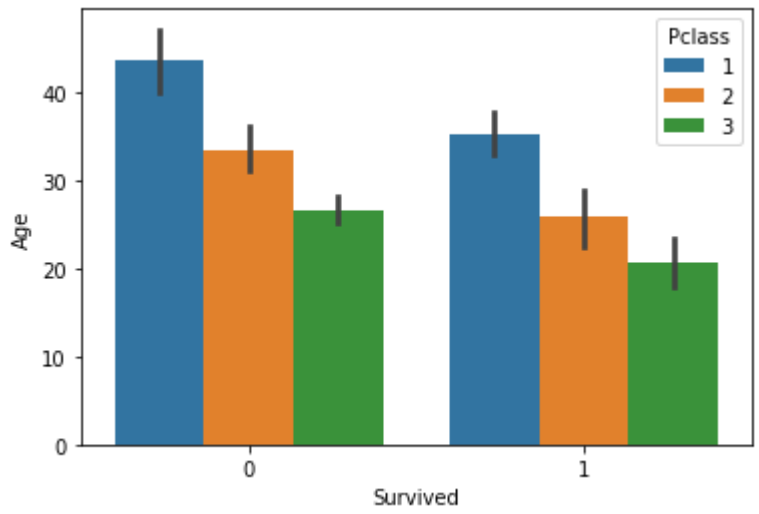
Out[119]: <AxesSubplot:xlabel='Age'>



- *most of the people on ship is of age between 15-45*

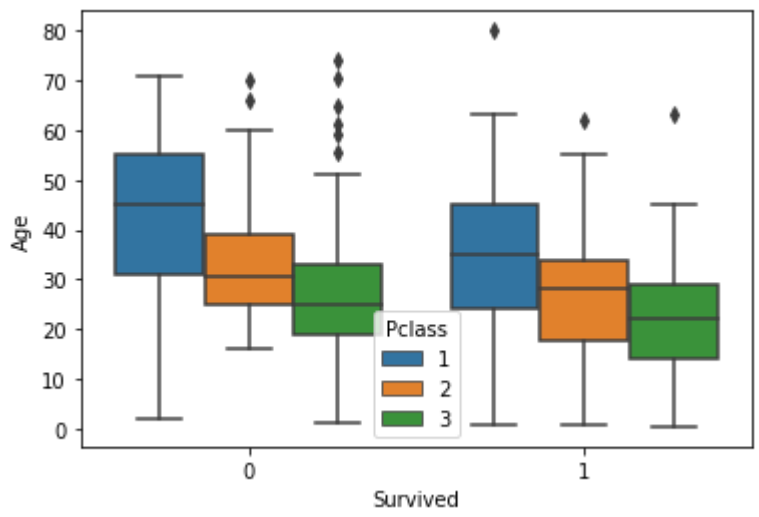
In [101]:
```
1 sns.barplot(df['Survived'],df['Age'],hue = df['Pclass'])
```

Out[101]: <AxesSubplot:xlabel='Survived', ylabel='Age'>



In [122]:
```
1 sns.boxplot(df.Survived,df.Age,hue = df.Pclass)
```

Out[122]: <AxesSubplot:xlabel='Survived', ylabel='Age'>



In [186]:
```
1 df[df['Age'].isnull()].groupby(['Survived','Pclass','Sex'])[['Sex']].count()
```

Out[186]:

			Sex
Survived	**Pclass**	**Sex**	
0	**1**	**male**	16
	2	**male**	7
	3	**female**	17
		male	85
1	**1**	**female**	9
		male	5
	2	**female**	2
		male	2
	3	**female**	25
		male	9

In [302]:
```
1 df1 = df.groupby(['Survived','Pclass','Sex'])[['Age']].quantile(0.5) # instead of quantile we can use mean/mode/median also
```

In [303]:
```
1 df1
```

Out[303]:

Survived	Pclass	Sex	Age
0	1	female	25.0
		male	45.5
	2	female	32.5
		male	30.5
	3	female	22.0
		male	25.0
1	1	female	35.0
		male	36.0
	2	female	28.0
		male	3.0
	3	female	19.0
		male	25.0

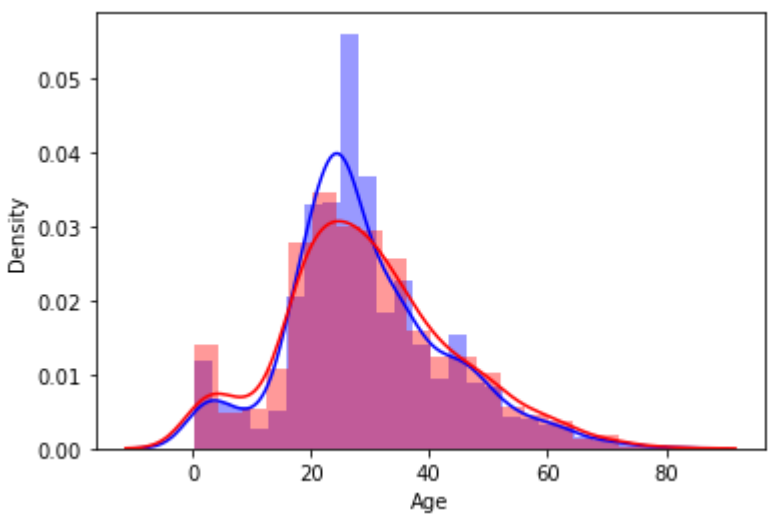
- *here in above table we have found 50% percetile age in each category by grouping "survived,Pclass,sex" column*
- **So Age missing value can be filled according to above table**
  - **For Example:-** *if Survived = 0 , Pclass = 1 and Sex = 'female' then* **Age** *Null value will be filled with* **= 25.0**

In [294]:
```
1 df_copy = df.copy()
```

In [298]:
```
1 for index,survived,Pclass,Sex in list(df[df['Age'].isnull()][['Survived','Pclass','Sex']].itertuples(name=None)):
2
3     df_copy['Age'].loc[index] = (df1.loc[survived,Pclass,Sex]).values[0]
4
```

In [315]:
```
1 sns.distplot(df_copy['Age'],color = 'Blue')
2 sns.distplot(df['Age'],color = 'Red')
```

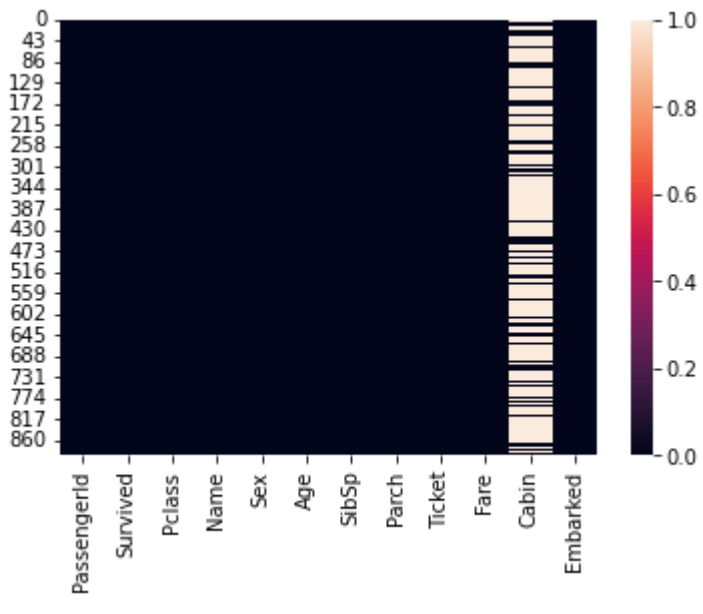
Out[315]: <AxesSubplot:xlabel='Age', ylabel='Density'>



blue line represent filled NAN value's dataframe and redline is old one.
increase in normally distribution

In [307]:
```
1 sns.heatmap(df_copy.isnull())
```

Out[307]: <AxesSubplot:>



- *No missing values in Age column*
- **Cabin** *contain 77% missing value there for we can* **delete column**

In [311]:
```
1 df_copy.drop(columns = 'Cabin',inplace = True)
```

In [ ]:
```
1
```