```
import warnings
warnings.filterwarnings('ignore')

import pandas as pd
import numpy as np

import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px

from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly
remount, call drive.mount("/content/drive", force_remount=True).
```

```
pd.set_option('display.max_columns', None)
burnoutDf=pd.read_csv('/content/drive/MyDrive/dataset/employee_burnout
_analysis.csv')
burnoutDf
```

```
                    Employee ID Date of Joining  Gender Company
Type  \
0      fffe32003000360033003200       9/30/2008  Female      Service

1          fffe3700360033003500      11/30/2008    Male      Service

2      fffe31003300320037003900       3/10/2008  Female      Product

3      fffe32003400380032003900       11/3/2008    Male      Service

4      fffe31003900340031003600       7/24/2008  Female      Service

...                         ...             ...     ...          ...

22745  fffe31003500370039003100      12/30/2008  Female      Service

22746  fffe33003000350031003800       1/19/2008  Female      Product

22747          fffe390032003000       11/5/2008    Male      Service

22748  fffe33003300320036003900       1/10/2008  Female      Service

22749      fffe3400350031003800        1/6/2008    Male      Product


      WFH Setup Available  Designation  Resource Allocation  \
0                      No            2                  3.0
1                     Yes            1                  2.0
2                     Yes            2                  NaN
3                     Yes            1                  1.0
4                      No            3                  7.0
```

```
...                    ...          ...                    ...
22745                   No            1                    3.0
22746                  Yes            3                    6.0
22747                  Yes            3                    7.0
22748                   No            2                    5.0
22749                   No            3                    6.0

       Mental Fatigue Score  Burn Rate
0                       3.8       0.16
1                       5.0       0.36
2                       5.8       0.49
3                       2.6       0.20
4                       6.9       0.52
...                     ...        ...
22745                   NaN       0.41
22746                   6.7       0.59
22747                   NaN       0.72
22748                   5.9       0.52
22749                   7.8       0.61

[22750 rows x 9 columns]
```

```
burnoutDf["Date of Joining"]=pd.to_datetime(burnoutDf["Date of
Joining"])

#Assigning Shape
burnoutDf.shape
```

```
(22750, 9)
```

```
#General Info Of Data
burnoutDf.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 22750 entries, 0 to 22749
Data columns (total 9 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   Employee ID           22750 non-null  object
 1   Date of Joining       22750 non-null  datetime64[ns]
 2   Gender                22750 non-null  object
 3   Company Type          22750 non-null  object
 4   WFH Setup Available   22750 non-null  object
 5   Designation           22750 non-null  int64
 6   Resource Allocation   21369 non-null  float64
 7   Mental Fatigue Score  20633 non-null  float64
 8   Burn Rate             21626 non-null  float64
dtypes: datetime64[ns](1), float64(3), int64(1), object(4)
memory usage: 1.6+ MB
```

```
burnoutDf.head()
```

```
                 Employee ID Date of Joining  Gender Company Type  \
0  fffe32003000360033003200      2008-09-30  Female      Service
1      fffe3700360033003500      2008-11-30    Male      Service
2  fffe31003300320037003900      2008-03-10  Female      Product
3  fffe32003400380032003900      2008-11-03    Male      Service
4  fffe31003900340031003600      2008-07-24  Female      Service

  WFH Setup Available  Designation  Resource Allocation  Mental
Fatigue Score  \
0                  No            2                  3.0
3.8
1                 Yes            1                  2.0
5.0
2                 Yes            2                  NaN
5.8
3                 Yes            1                  1.0
2.6
4                  No            3                  7.0
6.9

   Burn Rate
0       0.16
1       0.36
2       0.49
3       0.20
4       0.52
```

```
#Extracting the columns into Data set
burnoutDf.columns
```

```
Index(['Employee ID', 'Date of Joining', 'Gender', 'Company Type',
       'WFH Setup Available', 'Designation', 'Resource Allocation',
       'Mental Fatigue Score', 'Burn Rate'],
      dtype='object')
```

```
#Checking for Null Values
burnoutDf.isna().sum()
```

```
Employee ID                0
Date of Joining            0
Gender                     0
Company Type               0
WFH Setup Available        0
Designation                0
Resource Allocation     1381
Mental Fatigue Score    2117
Burn Rate               1124
dtype: int64
```

```
burnoutDf.duplicated().sum()
```

```
0
```

```
#Description Of Parameters
burnoutDf.describe()
```

```
        Designation  Resource Allocation  Mental Fatigue Score
Burn Rate
count  22750.000000         21369.000000          20633.000000
21626.000000
mean       2.178725             4.481398              5.728188
0.452005
std        1.135145             2.047211              1.920839
0.198226
min        0.000000             1.000000              0.000000
0.000000
25%        1.000000             3.000000              4.600000
0.310000
50%        2.000000             4.000000              5.900000
0.450000
75%        3.000000             6.000000              7.100000
0.590000
max        5.000000            10.000000             10.000000
1.000000
```

```
#Unique Values
for i,col in enumerate(burnoutDf.columns):
  print(f"\n\n{burnoutDf[col].unique()}")
  print(f"\n{burnoutDf[col].value_counts()}\n\n")
```

```
['fffe32003000360033003200' 'fffe3700360033003500'
 'fffe3100330032003700 3900' ... 'fffe390032003000'
 'fffe3300330032003600 3900' 'fffe3400350031003800']
```

```
fffe32003000360033003200    1
fffe3600360035003500        1
fffe3800360034003400        1
fffe3100300031003300 3600   1
fffe3100340035003100 3700   1
                           ..
fffe3300340034003200 3400   1
fffe3200310037003600 3600   1
fffe3100390031003500 3800   1
fffe3200340032003400 3200   1
fffe3400350031003800        1
Name: Employee ID, Length: 22750, dtype: int64
```

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 '2008-10-25T00:00:00.000000000' '2008-04-06T00:00:00.000000000'
 '2008-11-13T00:00:00.000000000' '2008-09-04T00:00:00.000000000'
 '2008-05-24T00:00:00.000000000' '2008-06-10T00:00:00.000000000'
 '2008-03-31T00:00:00.000000000' '2008-12-01T00:00:00.000000000'
 '2008-01-05T00:00:00.000000000' '2008-09-15T00:00:00.000000000'
 '2008-12-10T00:00:00.000000000' '2008-02-10T00:00:00.000000000'
 '2008-12-03T00:00:00.000000000' '2008-02-01T00:00:00.000000000']
```

```
2008-01-06    86
2008-05-21    85
2008-02-04    82
2008-07-16    81
2008-07-13    80
              ..
2008-06-27    44
2008-07-06    44
2008-07-04    43
2008-12-24    43
2008-12-07    39
Name: Date of Joining, Length: 366, dtype: int64
```

```
['Female' 'Male']

Female    11908
Male      10842
Name: Gender, dtype: int64



['Service' 'Product']

Service    14833
Product     7917
Name: Company Type, dtype: int64



['No' 'Yes']

Yes    12290
No     10460
Name: WFH Setup Available, dtype: int64



[2 1 3 0 4 5]

2    7588
3    5985
1    4881
4    2391
0    1507
5     398
Name: Designation, dtype: int64



[ 3.  2. nan  1.  7.  4.  6.  5.  8. 10.  9.]

4.0     3893
5.0     3861
3.0     3192
6.0     2943
2.0     2075
7.0     1965
```

```
1.0     1791
8.0     1044
9.0      446
10.0     159
Name: Resource Allocation, dtype: int64
```

```
[ 3.8  5.   5.8  2.6  6.9  3.6  7.9  4.4  nan  5.3  1.8  4.7  5.9  6.7
  4.   7.6  6.3  7.7  6.6  7.4  3.9  3.   8.7  7.3  5.4  6.   7.5 10.
  6.4  5.1  5.6  6.1  3.1  8.   6.8  4.9  9.2  6.5  6.2  8.2  4.1  4.3
  0.8  2.9  2.   9.1  0.   5.7  8.3  5.5  7.   3.3  7.8  7.2  5.2  8.9
  4.5  8.1  8.6  9.5  3.5  4.8  2.4  3.7  1.   8.8  9.3  4.6  9.9  0.5
  2.8  9.   3.4  4.2  1.6  2.7  1.3  3.2  8.4  7.1  9.4  2.1  9.7  2.5
  1.9  1.7  9.6  0.7  0.2  1.2  8.5  9.8  2.2  1.1  0.9  2.3  0.4  1.4
  1.5  0.6  0.3  0.1]

6.0    470
5.8    464
5.9    458
6.1    457
6.3    454
      ...
0.5     24
0.2     23
0.4     19
0.1     17
0.3     13
Name: Mental Fatigue Score, Length: 101, dtype: int64
```

```
[0.16 0.36 0.49 0.2  0.52 0.29 0.62 0.33 0.56 0.67 0.5  0.12 0.4  0.51
 0.32 0.39 0.59 0.22 0.68 0.57 0.47 0.46 0.61 0.91 0.44 0.6  0.45 0.19
 0.31 0.81 0.42 0.53  nan 0.94 0.37 0.65 0.38 0.15 0.26 0.28 0.71 0.8
 0.63 0.79 0.72 0.34 0.27 0.66 0.04 0.05 0.11 0.41 0.76 0.43 0.85 0.35
 0.   0.55 0.48 0.7  0.18 0.23 0.25 0.75 0.1  0.73 0.58 0.88 0.77 0.3
 0.06 0.03 0.69 0.24 0.74 0.86 0.92 0.78 0.21 0.98 0.02 0.82 0.93 0.83
 0.87 0.64 0.54 0.17 1.   0.08 0.09 0.14 0.13 0.07 0.84 0.99 0.01 0.97
 0.95 0.9  0.96 0.89]

0.47    475
0.43    444
0.41    434
0.45    431
0.50    428
       ...
0.98     18
```

```
0.97     17
0.95     17
0.96     13
0.99      8
Name: Burn Rate, Length: 101, dtype: int64
```

```
#Minimizing irrelevant column
burnoutDf=burnoutDf.drop(['Employee ID'],axis=1)
```

```
intFloatburnoutDf = burnoutDf.select_dtypes([np.int, np.float])

for i, col in enumerate(intFloatburnoutDf.columns):
    if intFloatburnoutDf[col].skew() >= 0.1:
        print("\n", col, "feature is Positively Skewed and value is:",
intFloatburnoutDf[col].skew())
    elif intFloatburnoutDf[col].skew() <= -0.1:
        print("\n", col, "feature is Negatively Skewed and value is:",
intFloatburnoutDf[col].skew())
    else:
        print("\n", col, "feature is Normally Distributed and value
is:", intFloatburnoutDf[col].skew())
```

```
 Designation feature is Normally Distributed and value is:
0.09242138478903683

 Resource Allocation feature is Positively Skewed and value is:
0.20457273454318103

 Mental Fatigue Score feature is Negatively Skewed and value is: -
0.4308950578815428

 Burn Rate feature is Normally Distributed and value is:
0.045737370909640515
```

```
#Replace the null values with mean
burnoutDf['Resource Allocation'].fillna(burnoutDf['Resource
Allocation'].mean(),inplace= True)
burnoutDf['Mental Fatigue Score'].fillna(burnoutDf['Mental Fatigue
Score'].mean(),inplace= True)
burnoutDf['Burn Rate'].fillna(burnoutDf['Burn Rate'].mean(), inplace =
True)
```

```
burnoutDf.isna().sum()
```

```
Date of Joining          0
Gender                   0
Company Type             0
WFH Setup Available      0
Designation              0
Resource Allocation      0
Mental Fatigue Score     0
Burn Rate                0
dtype: int64
```

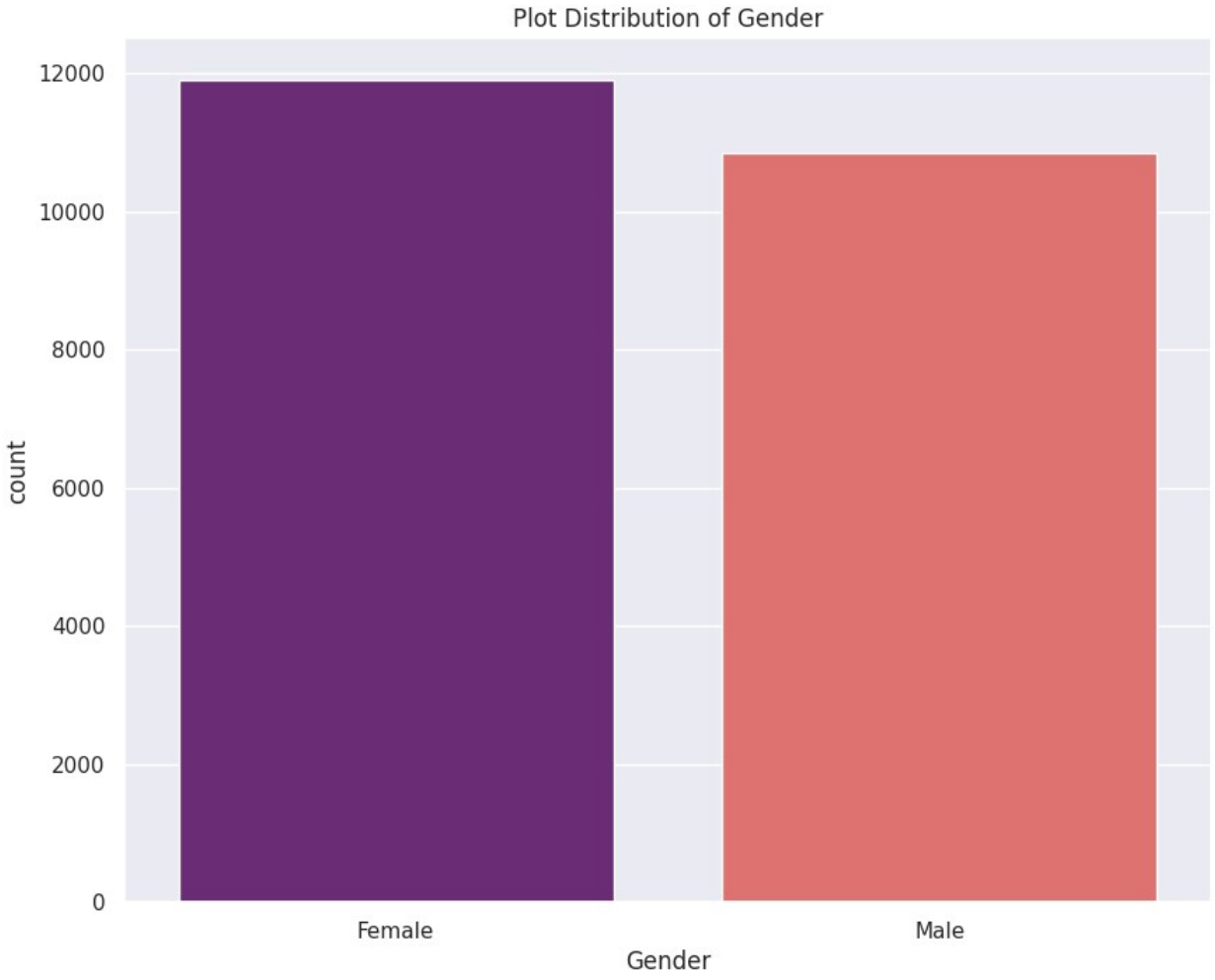
```
burnoutDf.corr()
```

```
                      Designation  Resource Allocation  Mental Fatigue
Score  \
Designation              1.000000             0.852046
0.656445
Resource Allocation      0.852046             1.000000
0.739268
Mental Fatigue Score     0.656445             0.739268
1.000000
Burn Rate                0.719284             0.811062
0.878217

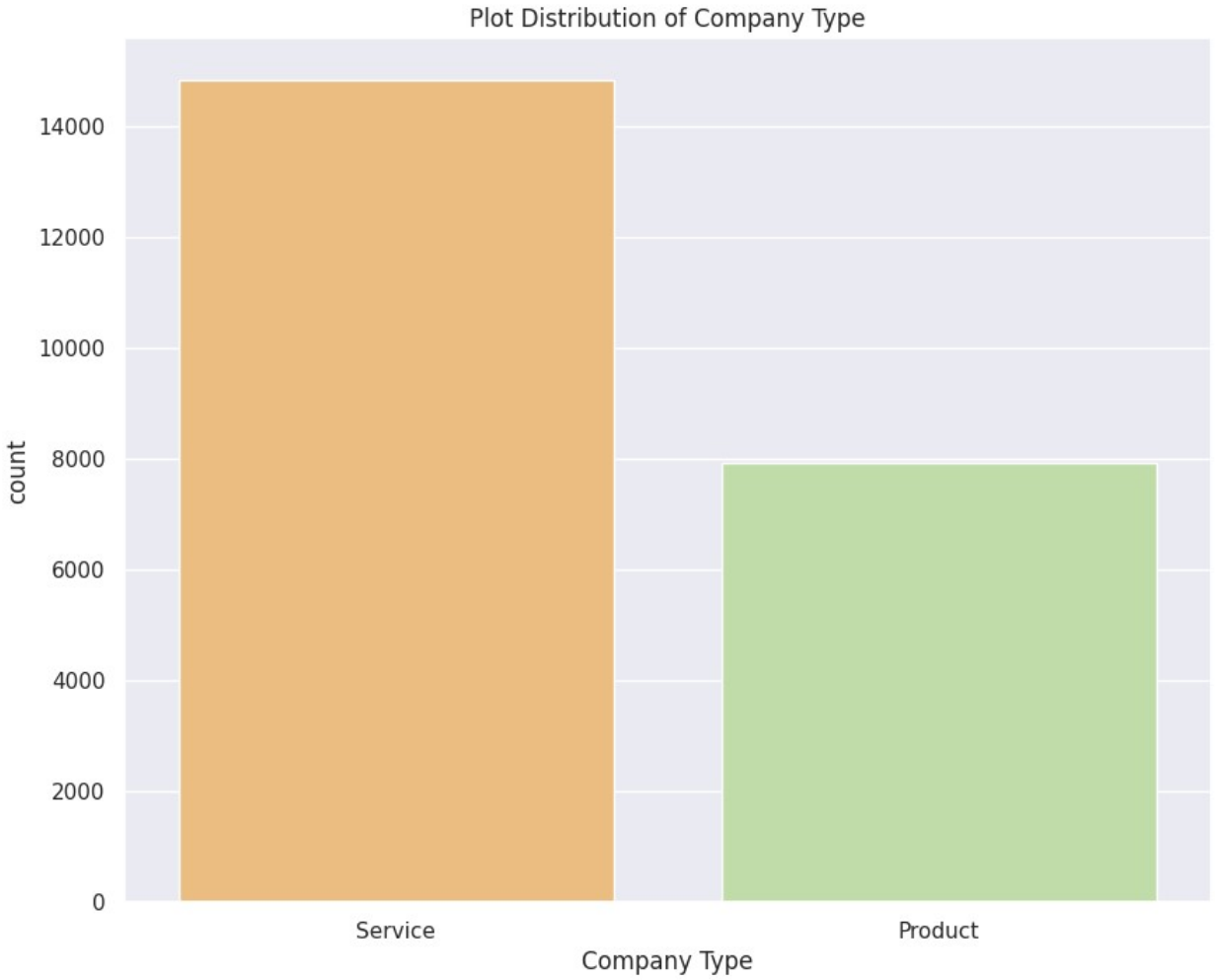
                      Burn Rate
Designation            0.719284
Resource Allocation    0.811062
Mental Fatigue Score   0.878217
Burn Rate              1.000000
```

```
#Data Visualization
corr=burnoutDf.corr()
sns.set(rc={'figure.figsize':(14,12)})
fig = px.imshow(corr,text_auto=True, aspect="auto")
fig.show()

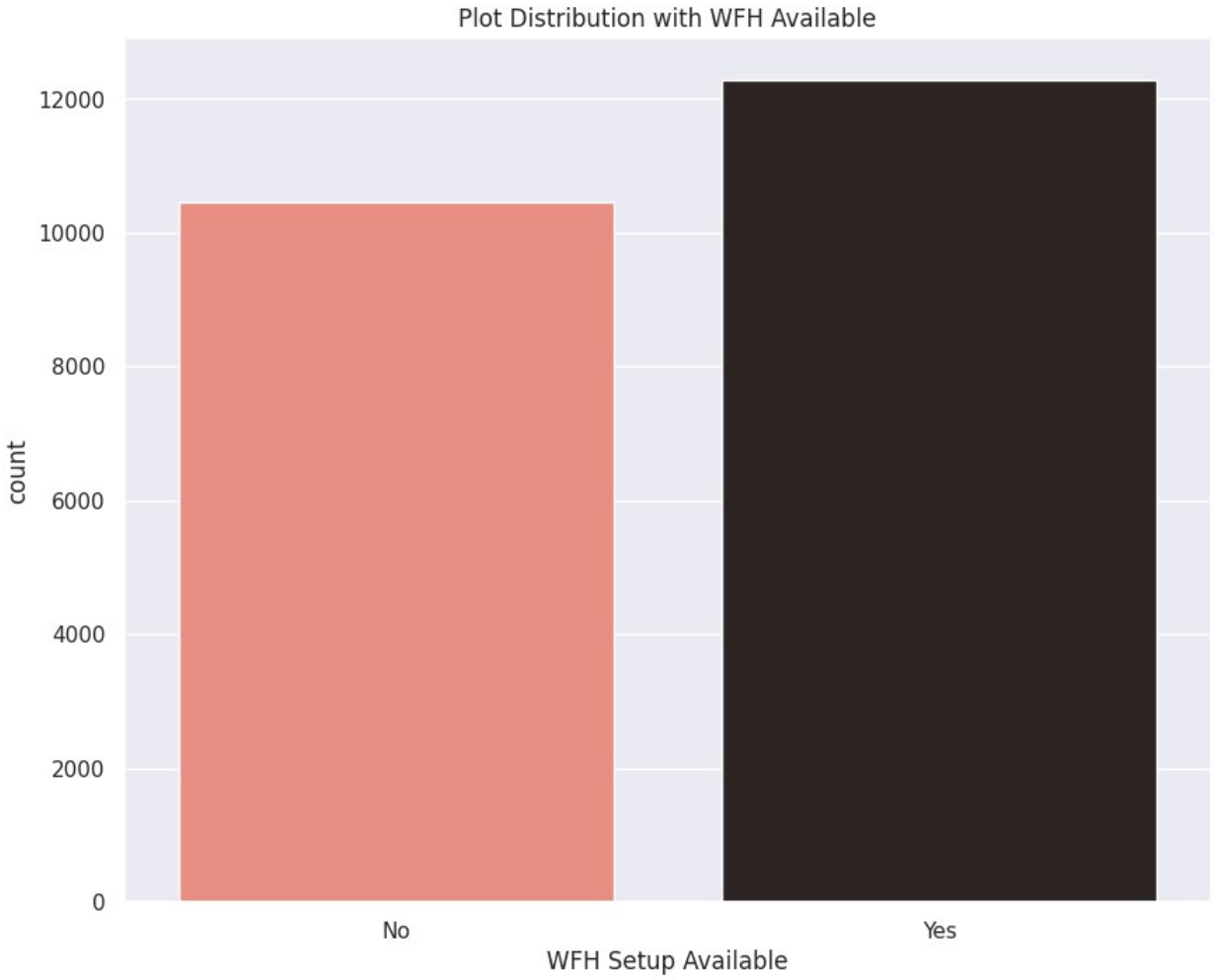
#Plot Distribution of Gender
plt.figure(figsize=(10,8))
sns.countplot(x="Gender", data=burnoutDf, palette="magma")
plt.title("Plot Distribution of Gender")
plt.show()
```




```
#plot distribution of Company
plt.figure(figsize=(10,8))
sns.countplot(x="Company Type", data=burnoutDf, palette="Spectral")
plt.title("Plot Distribution of Company Type");
plt.show()
```




```
plt.figure(figsize=(10,8))
sns.countplot(x= "WFH Setup Available",data=burnoutDf, palette
="dark:salmon_r")
plt.title("Plot Distribution with WFH Available")
plt.show()
```




```
#Attributes Histogram
burn_st = burnoutDf.loc[:, 'Date of Joining':'Burn Rate']
burn_st = burn_st.select_dtypes([int, float])
for i, col in enumerate(burn_st.columns):
  fig = px.histogram(burn_st, x=col, title ="Plot Distribution of"
+col,color_discrete_sequence=['indianred'])
  fig.update_layout(bargap=0.2)
  fig.show()


#Burnrate on basis of Designation
fig = px.line(burnoutDf, y="Burn Rate",color="Designation",title="Burn
Rate of
Designation",color_discrete_sequence=px.colors.qualitative.Pastel1)
fig.update_layout(bargap=0.1)
fig.show()

#Burnrate on basis of Gender
fig = px.line(burnoutDf, y="Burn Rate",color="Gender",title="Burn Rate
of Gender",color_discrete_sequence=px.colors.qualitative.Pastel1)
```

```
fig.update_layout(bargap=0.2)
fig.show()

#Mental Fatigue vs Designations
fig = px.line(burnoutDf, y="Mental Fatigue
Score",color="Designation",title="Mental Fatigue vs
Designation",color_discrete_sequence=px.colors.qualitative.Pastel1)
fig.update_layout(bargap=0.2)
fig.show()

#Plot Distribution of "Designation vs mental fatigue"
sns.relplot(
    data = burnoutDf, x="Designation" , y="Mental Fatigue
Score",col="Company Type",
    hue= "Company Type", size="Burn Rate",style="Gender",
    palette=["g","r"], sizes=(50,200)

)
```

```
<seaborn.axisgrid.FacetGrid at 0x7fd8597eb640>
```


```
#Label encoding
from sklearn import preprocessing
Label_encode = preprocessing.LabelEncoder()

#Assigning
burnoutDf['GenderLabel'] =
Label_encode.fit_transform(burnoutDf['Gender'].values)
burnoutDf['Company_TypeLabel'] =
Label_encode.fit_transform(burnoutDf['Company Type'].values)
burnoutDf['WFH_Setup_AvailableLabel'] =
Label_encode.fit_transform(burnoutDf['WFH Setup Available'].values)
```

```
#Checking Assigned Values
gn = burnoutDf.groupby('Gender')
gn = gn['GenderLabel']
gn.first()
```

```
Gender
Female    0
Male      1
Name: GenderLabel, dtype: int64
```

```
#Checking Assigned Values
ct = burnoutDf.groupby('Company Type')
ct = ct['Company_TypeLabel']
ct.first()
```

```
Company Type
Product    0
Service    1
Name: Company_TypeLabel, dtype: int64
```

```
#Checking Assigned Values
wsa = burnoutDf.groupby('WFH Setup Available')
wsa = wsa['WFH_Setup_AvailableLabel']
wsa.first()
```

```
WFH Setup Available
No     0
Yes    1
Name: WFH_Setup_AvailableLabel, dtype: int64
```

```
burnoutDf.tail(10)
```

```
      Date of Joining  Gender Company Type WFH Setup Available
Designation  \
22740      2008-09-05  Female      Product                   No
3
22741      2008-01-07    Male      Product                   No
2
22742      2008-07-28    Male      Product                   No
3
22743      2008-12-15  Female      Product                  Yes
1
22744      2008-05-27    Male      Product                   No
3
22745      2008-12-30  Female      Service                   No
1
22746      2008-01-19  Female      Product                  Yes
3
22747      2008-11-05    Male      Service                  Yes
3
22748      2008-01-10  Female      Service                   No
```

```
2
22749      2008-01-06    Male      Product                   No
3

       Resource Allocation  Mental Fatigue Score  Burn Rate
GenderLabel  \
22740                  6.0              7.300000   0.550000
0
22741                  5.0              6.000000   0.452005
1
22742                  5.0              8.100000   0.690000
1
22743                  3.0              6.000000   0.480000
0
22744                  7.0              6.200000   0.540000
1
22745                  3.0              5.728188   0.410000
0
22746                  6.0              6.700000   0.590000
0
22747                  7.0              5.728188   0.720000
1
22748                  5.0              5.900000   0.520000
0
22749                  6.0              7.800000   0.610000
1

       Company_TypeLabel  WFH_Setup_AvailableLabel
22740                  0                         0
22741                  0                         0
22742                  0                         0
22743                  0                         1
22744                  0                         0
22745                  1                         0
22746                  0                         1
22747                  1                         1
22748                  1                         0
22749                  0                         0
```

```
# Future selection
Columns = ['Designation', 'Resource Allocation','Mental Fatigue
Score',

'GenderLabel','Company_TypeLabel','WFH_Setup_AvailableLabel']
X=burnoutDf[Columns]
y=burnoutDf['Burn Rate']

print(X)
```

```
       Designation  Resource Allocation  Mental Fatigue Score
GenderLabel  \
0                2             3.000000              3.800000
0
1                1             2.000000              5.000000
1
2                2             4.481398              5.800000
0
3                1             1.000000              2.600000
1
4                3             7.000000              6.900000
0
...            ...                  ...                   ...
...
22745            1             3.000000              5.728188
0
22746            3             6.000000              6.700000
0
22747            3             7.000000              5.728188
1
22748            2             5.000000              5.900000
0
22749            3             6.000000              7.800000
1

       Company_TypeLabel  WFH_Setup_AvailableLabel
0                      1                         0
1                      1                         1
2                      0                         1
3                      1                         1
4                      1                         0
...                  ...                       ...
22745                  1                         0
22746                  0                         1
22747                  1                         1
22748                  1                         0
22749                  0                         0

[22750 rows x 6 columns]
```

```
print(y)
```

```
0        0.16
1        0.36
2        0.49
3        0.20
4        0.52
        ...
22745    0.41
22746    0.59
```

```
22747    0.72
22748    0.52
22749    0.61
Name: Burn Rate, Length: 22750, dtype: float64
```

```
from sklearn.decomposition import PCA

pca = PCA(0.95)
X_pca = pca.fit_transform(X)

print("PCA SHAPE OF X is:", X_pca.shape, "and original shape is:",
X.shape)
print("% of importance of selected features is:",
pca.explained_variance_ratio_)
print("The number of features selected through PCA is:",
pca.n_components_)
```

```
PCA SHAPE OF X is: (22750, 4) and original shape is: (22750, 6)
% of importance of selected features is: [0.78371089 0.11113597
0.03044541 0.02632422]
The number of features selected through PCA is: 4
```

Data Splitting

```
from sklearn.model_selection import train_test_split
X_train_pca,X_test, Y_train,Y_test= train_test_split(X_pca,y,test_size
= 0.25, random_state=10)

print(X_train_pca.shape,X_test.shape,Y_train.shape,Y_test.shape)
```

```
(17062, 4) (5688, 4) (17062,) (5688,)
```

```
from sklearn.metrics import r2_score
#Random Forest regressor
from sklearn.ensemble import RandomForestRegressor

rf_model = RandomForestRegressor()
rf_model.fit(X_train_pca, Y_train)

train_pred_rf = rf_model.predict(X_train_pca)
train_r2 = r2_score(Y_train, train_pred_rf)
test_pred_rf = rf_model.predict(X_test)
test_r2 = r2_score(Y_test,test_pred_rf)

print("Accuracy score of train data: "+str(round(100*train_r2,4))+"%")
print("Accuracy score of test data:"+str(round(100*test_r2,4))+"%")
```

```
Accuracy score of train data: 91.1968%
Accuracy score of test data:83.8641%
```