Spaceship Titanic | Kaggle Challenge

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EDA

In [2]:

```
import pandas as pd
import matplotlib.pyplot as plt
```

In [3]:

```
# importing dataset
spaceship_data = pd.read_csv("train.csv")
# printing the first 5 rows of dataset
spaceship_data.head()
```

Out[3]:

	PassengerId	HomePlanet	CryoSleep	Cabin	Destination	Age	VIP	RoomService
0	0001_01	Europa	False	B/0/P	TRAPPIST-1e	39.0	False	0.0
1	0002_01	Earth	False	F/0/S	TRAPPIST-1e	24.0	False	109.0
2	0003_01	Europa	False	A/0/S	TRAPPIST-1e	58.0	True	43.0
3	0003_02	Europa	False	A/0/S	TRAPPIST-1e	33.0	False	0.0
4	0004_01	Earth	False	F/1/S	TRAPPIST-1e	16.0	False	303.0

In [4]:

```
spaceship_data.dropna(inplace=True)
```

In [5]:

```
spaceship_columns = list(spaceship_data.columns)
spaceship_columns
```

Out[5]:

```
['PassengerId',
 'HomePlanet',
 'CryoSleep',
 'Cabin',
 'Destination',
 'Age',
 'VIP',
 'RoomService',
 'FoodCourt',
 'ShoppingMall',
 'Spa',
 'VRDeck',
 'Name',
 'Transported']
```

In [6]:

```
print("Missing values distribution: ")
print((spaceship_data.isnull().mean() * 100).round(2))
print("")
```

```
Missing values distribution: 
PassengerId     0.0
HomePlanet      0.0
CryoSleep       0.0
Cabin           0.0
Destination     0.0
Age             0.0
VIP             0.0
RoomService     0.0
FoodCourt       0.0
ShoppingMall    0.0
Spa             0.0
VRDeck          0.0
Name            0.0
Transported     0.0
dtype: float64
```

In [7]:

```
# check datatype in each column
print("Column datatypes: ")
print(spaceship_data.dtypes)
```

```
Column datatypes: 
PassengerId      object
HomePlanet       object
CryoSleep        object
Cabin            object
Destination      object
Age             float64
VIP              object
RoomService     float64
FoodCourt       float64
ShoppingMall    float64
Spa             float64
VRDeck          float64
Name             object
Transported        bool
dtype: object
```

In [8]:

```
# getting all the columns with string/mixed type values
str_cols = list(spaceship_data.columns)
str_cols.remove('Age')
str_cols.remove('RoomService')
str_cols.remove('FoodCourt')
str_cols.remove('ShoppingMall')
str_cols.remove('Spa')
str_cols.remove('VRDeck')
```

In [9]:

```
for i in str_cols:
    if spaceship_data[i].dtype == 'object':
        spaceship_data[i] = spaceship_data[i].astype(str).str.strip()
```

In [10]:

```
print("Missing values distribution after filling: ")
print((spaceship_data.isnull().mean() * 100).round(2))
print("")
```

```
Missing values distribution after filling:
PassengerId     0.0
HomePlanet      0.0
CryoSleep       0.0
Cabin           0.0
Destination     0.0
Age             0.0
VIP             0.0
RoomService     0.0
FoodCourt       0.0
ShoppingMall    0.0
Spa             0.0
VRDeck          0.0
Name            0.0
Transported     0.0
dtype: float64
```

In [11]:

```
spaceship_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 6606 entries, 0 to 8692
Data columns (total 14 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   PassengerId   6606 non-null   object 
 1   HomePlanet    6606 non-null   object 
 2   CryoSleep     6606 non-null   object 
 3   Cabin         6606 non-null   object 
 4   Destination   6606 non-null   object 
 5   Age           6606 non-null   float64
 6   VIP           6606 non-null   object 
 7   RoomService   6606 non-null   float64
 8   FoodCourt     6606 non-null   float64
 9   ShoppingMall  6606 non-null   float64
 10  Spa           6606 non-null   float64
 11  VRDeck        6606 non-null   float64
 12  Name          6606 non-null   object 
 13  Transported   6606 non-null   bool   
dtypes: bool(1), float64(6), object(7)
memory usage: 729.0+ KB
```

In [12]:

```
spaceship_data.duplicated()
```

Out[12]:
```
0       False
1       False
2       False
3       False
4       False
        ...
8688    False
8689    False
8690    False
8691    False
8692    False
Length: 6606, dtype: bool
```

In [13]:
```python
spaceship_data['RoomService'] = pd.to_numeric(spaceship_data['RoomService'],
spaceship_data['FoodCourt'] = pd.to_numeric(spaceship_data['FoodCourt'], err
spaceship_data['ShoppingMall'] = pd.to_numeric(spaceship_data['ShoppingMall'
spaceship_data['Spa'] = pd.to_numeric(spaceship_data['Spa'], errors='coerce'
spaceship_data['VRDeck'] = pd.to_numeric(spaceship_data['VRDeck'], errors='c

spaceship_data['TotalBill'] = spaceship_data[['RoomService', 'FoodCourt', 'S
print(spaceship_data['TotalBill'])
```

```
0           0.0
1         736.0
2       10383.0
3        5176.0
4        1091.0
         ...
8688     8536.0
8689        0.0
8690     1873.0
8691     4637.0
8692     4826.0
Name: TotalBill, Length: 6606, dtype: float64
```

In [14]:
```python
spaceship_data.head()
```

Out[14]:

	PassengerId	HomePlanet	CryoSleep	Cabin	Destination	Age	VIP	RoomService
0	0001_01	Europa	False	B/0/P	TRAPPIST-1e	39.0	False	0.0
1	0002_01	Earth	False	F/0/S	TRAPPIST-1e	24.0	False	109.0
2	0003_01	Europa	False	A/0/S	TRAPPIST-1e	58.0	True	43.0
3	0003_02	Europa	False	A/0/S	TRAPPIST-1e	33.0	False	0.0
4	0004_01	Earth	False	F/1/S	TRAPPIST-1e	16.0	False	303.0

In [15]:
```python
df = pd.DataFrame(spaceship_data)
```

In [16]:

```
df.head()
```

Out[16]:

	PassengerId	HomePlanet	CryoSleep	Cabin	Destination	Age	VIP	RoomService
0	0001_01	Europa	False	B/0/P	TRAPPIST-1e	39.0	False	0.0
1	0002_01	Earth	False	F/0/S	TRAPPIST-1e	24.0	False	109.0
2	0003_01	Europa	False	A/0/S	TRAPPIST-1e	58.0	True	43.0
3	0003_02	Europa	False	A/0/S	TRAPPIST-1e	33.0	False	0.0
4	0004_01	Earth	False	F/1/S	TRAPPIST-1e	16.0	False	303.0

In [17]:

```
name_to_search = "Andan Estron"


filtered_df = df[df['Name'] == name_to_search]


print(filtered_df)
```

```
Empty DataFrame
Columns: [PassengerId, HomePlanet, CryoSleep, Cabin, Destination, Age, VIP, R
oomService, FoodCourt, ShoppingMall, Spa, VRDeck, Name, Transported, TotalBil
l]
Index: []
```

In [18]:

```
df.isna().sum()
```

Out[18]:

```
PassengerId     0
HomePlanet      0
CryoSleep       0
Cabin           0
Destination     0
Age             0
VIP             0
RoomService     0
FoodCourt       0
ShoppingMall    0
Spa             0
VRDeck          0
Name            0
Transported     0
TotalBill       0
dtype: int64
```

In [19]:

```
df.tail()
```

Out[19]:

	PassengerId	HomePlanet	CryoSleep	Cabin	Destination	Age	VIP	Room
8688	9276_01	Europa	False	A/98/P	55 Cancri e	41.0	True	
8689	9278_01	Earth	True	G/1499/S	PSO J318.5-22	18.0	False	
8690	9279_01	Earth	False	G/1500/S	TRAPPIST-1e	26.0	False	
8691	9280_01	Europa	False	E/608/S	55 Cancri e	32.0	False	
8692	9280_02	Europa	False	E/608/S	TRAPPIST-1e	44.0	False	

In [20]:

```
df.describe()
```

Out[20]:

	Age	RoomService	FoodCourt	ShoppingMall	Spa	
count	6606.000000	6606.000000	6606.000000	6606.000000	6606.000000	6606
mean	28.894036	222.991674	478.958523	178.356494	313.161520	303
std	14.533429	644.987936	1678.592291	576.328407	1144.016291	112
min	0.000000	0.000000	0.000000	0.000000	0.000000	0
25%	19.000000	0.000000	0.000000	0.000000	0.000000	0
50%	27.000000	0.000000	0.000000	0.000000	0.000000	0
75%	38.000000	49.000000	82.750000	30.000000	65.000000	52
max	79.000000	9920.000000	29813.000000	12253.000000	22408.000000	20336

In [21]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 6606 entries, 0 to 8692
Data columns (total 15 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   PassengerId   6606 non-null   object 
 1   HomePlanet    6606 non-null   object 
 2   CryoSleep     6606 non-null   object 
 3   Cabin         6606 non-null   object 
 4   Destination   6606 non-null   object 
 5   Age           6606 non-null   float64
 6   VIP           6606 non-null   object 
 7   RoomService   6606 non-null   float64
 8   FoodCourt     6606 non-null   float64
 9   ShoppingMall  6606 non-null   float64
 10  Spa           6606 non-null   float64
 11  VRDeck        6606 non-null   float64
 12  Name          6606 non-null   object 
 13  Transported   6606 non-null   bool   
 14  TotalBill     6606 non-null   float64
dtypes: bool(1), float64(7), object(7)
memory usage: 780.6+ KB
```

```
In [22]: df.corr()
```

```
/var/folders/_j/z5vgmkhn015dp664z1048vzh0000gn/T/ipykernel_90734/1134722465.p
y:1: FutureWarning: The default value of numeric_only in DataFrame.corr is de
precated. In a future version, it will default to False. Select only valid co
lumns or specify the value of numeric_only to silence this warning.
  df.corr()
```

Out[22]:

	Age	RoomService	FoodCourt	ShoppingMall	Spa	VRDec
Age	1.000000	0.074783	0.135844	0.042314	0.123820	0.10503
RoomService	0.074783	1.000000	-0.013614	0.060478	0.012472	-0.02600
FoodCourt	0.135844	-0.013614	1.000000	-0.012320	0.215995	0.21699
ShoppingMall	0.042314	0.060478	-0.012320	1.000000	0.022168	0.00038
Spa	0.123820	0.012472	0.215995	0.022168	1.000000	0.14944
VRDeck	0.105031	-0.026002	0.216997	0.000383	0.149447	1.00000
Transported	-0.082553	-0.247291	0.055025	0.011602	-0.219854	-0.20795
TotalBill	0.196001	0.224410	0.753124	0.216893	0.592827	0.57533

Data Visualization

Chart-1 : Distribution of passangers according to homeplanet.

In [23]:

```
df['HomePlanet'].isna().sum()
df['HomePlanet'].value_counts()
```

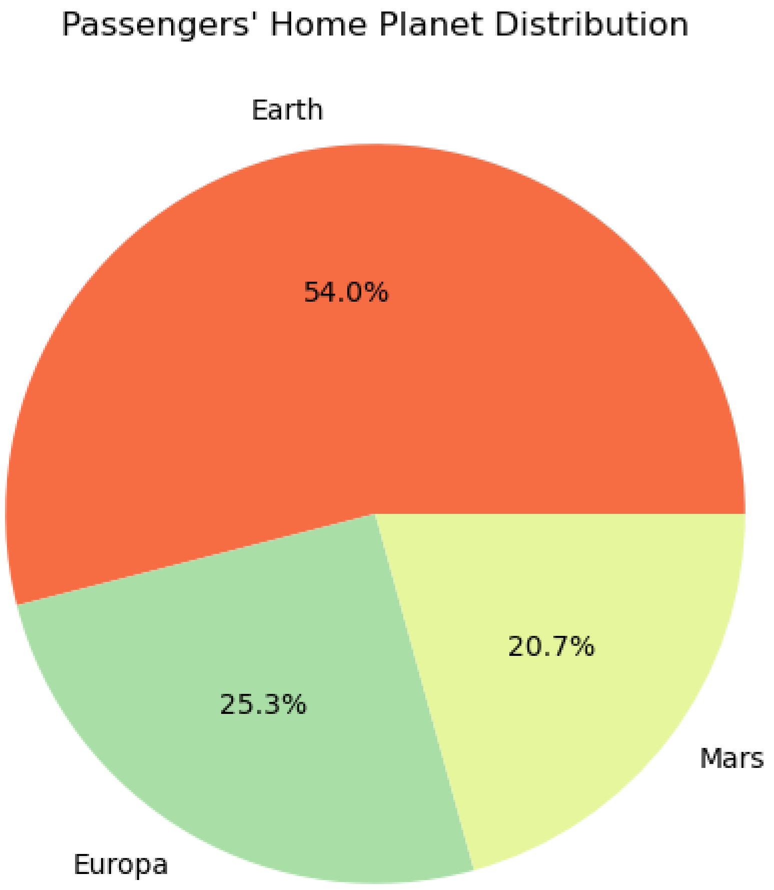
Out[23]:

```
Earth     3566
Europa    1673
Mars      1367
Name: HomePlanet, dtype: int64
```

In [24]:

```
import pandas as pd
import matplotlib.pyplot as plt



planet_counts = df['HomePlanet'].value_counts()
print(planet_counts)
mycolors = ["#F66D44", "#AADEA7", "#E6F69D", "#64C2A6"]

plt.figure(figsize=(8, 6))
plt.pie(planet_counts, labels=planet_counts.index, autopct='%1.1f%%', colors
plt.title("Passengers' Home Planet Distribution")

# Display the chart
plt.show()
```

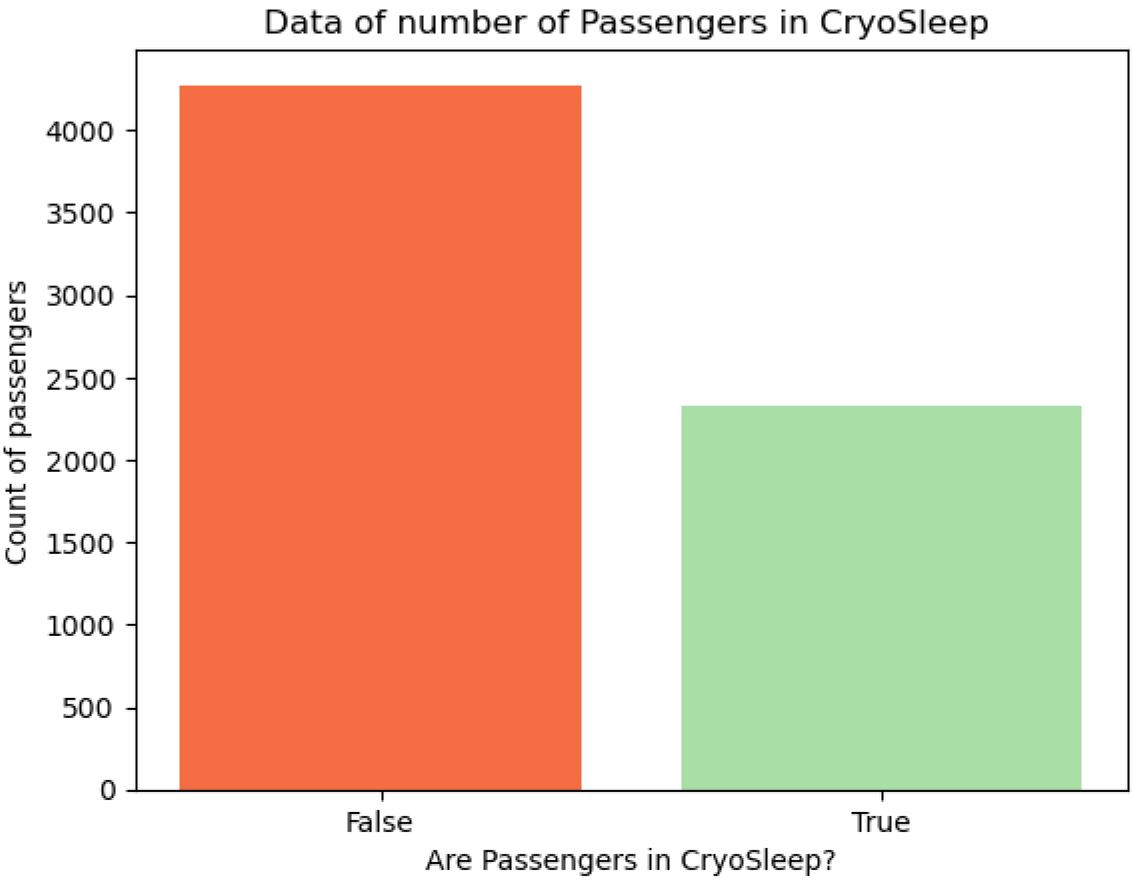
```
Earth     3566
Europa    1673
Mars      1367
Name: HomePlanet, dtype: int64
```



Bar chart of passengers in cryosleep

In [25]:

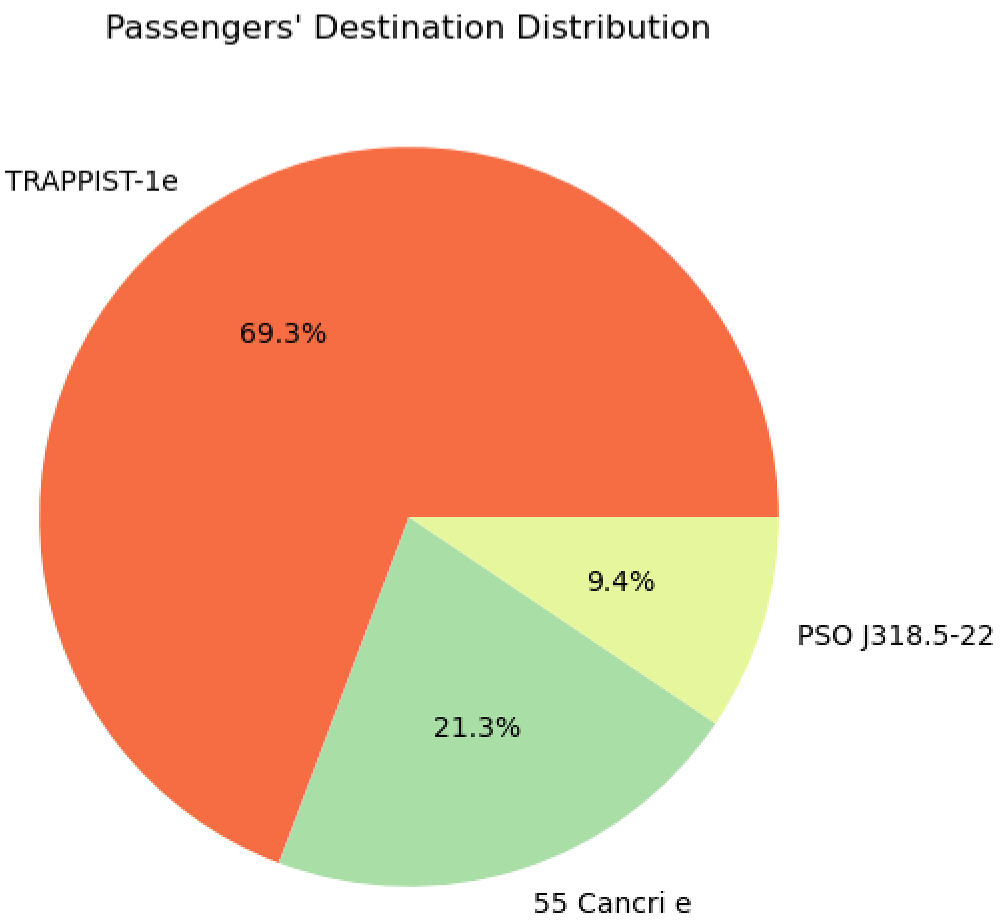
```
mycolors = ["#F66D44", "#AADEA7", "#E6F69D", "#64C2A6"]
value_counts = df['CryoSleep'].value_counts()

# Create a bar chart using matplotlib
plt.bar(value_counts.index.astype(str), value_counts.values, color=mycolors)


plt.xlabel('Are Passengers in CryoSleep?')
plt.ylabel('Count of passengers')
plt.title('Data of number of Passengers in CryoSleep ')

# Display the chart
plt.show()
```



Pie chart of passenger's destination

In [26]:

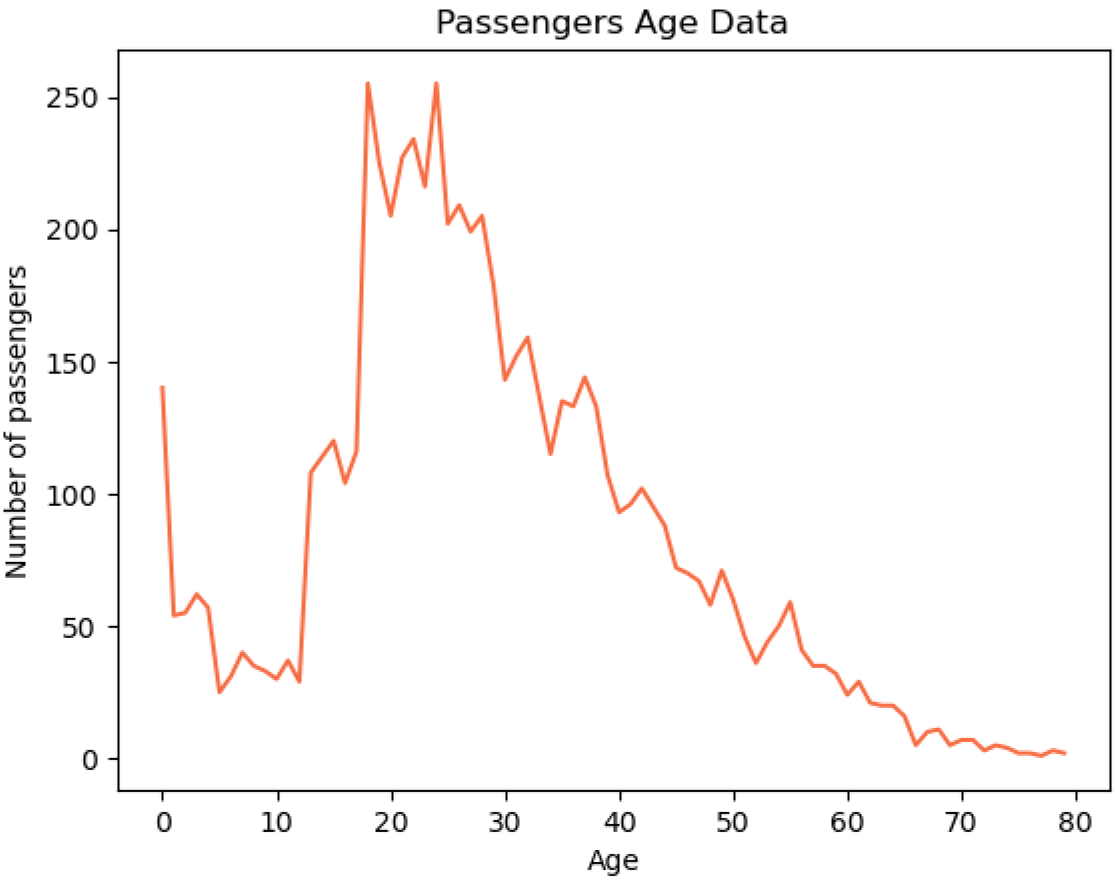
```
df['Destination'].fillna('others', inplace=True)

# Count the number of passengers from each home planet
planet_counts = df['Destination'].value_counts()
mycolors = ["#F66D44", "#AADEA7", "#E6F69D", "#64C2A6"]
# Create a pie chart
plt.figure(figsize=(8, 6))
plt.pie(planet_counts, labels=planet_counts.index, autopct='%1.1f%%', colors
plt.title("Passengers' Destination Distribution")

# Display the chart
plt.show()
```



Age distribution of passengers

In [27]:

```
df['Age'] = pd.to_numeric(df['Age'], errors='coerce')
df = df[df['Age'].notnull()]

# Convert the 'Passengers Age' column to float
df['Age'] = df['Age'].astype(float)
passengers_age = df['Age']

age_counts = passengers_age.value_counts().sort_index()
line_color = '#F66D44'

plt.plot(age_counts.index, age_counts.values, color=line_color)


plt.xlabel('Age')
plt.ylabel('Number of passengers')
plt.title('Passengers Age Data')


plt.show()
```



Prediction Model-Random Forest Classifier

Random Forest is a suitable choice for this dataset due to its ability to handle a mix of categorical and numerical features, capture complex relationships, and provide feature importance. With features such as home planet, cryo-sleep status, cabin details, destination, age, VIP status, and various amenities, the dataset likely contains diverse patterns and interactions. Random Forest's ensemble of decision trees can effectively learn and predict whether a passenger was transported to an alternate dimension during the collision. Additionally, the feature importance provided by Random Forest can help identify the most influential factors contributing to the prediction. Overall, Random Forest offers a robust and interpretable solution for this classification task.

In [28]:

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, precision_score, recall_score, f



features = df[['HomePlanet', 'CryoSleep',  'Destination', 'Age', 'VIP', 'Roo
target = df['Transported']


features_encoded = pd.get_dummies(features)

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(features_encoded, target
# Initialize the Random Forest Classifier
rf_classifier = RandomForestClassifier(n_estimators=100, random_state=42)

# Train the classifier
rf_classifier.fit(X_train, y_train)

# Make predictions on the testing set
y_pred = rf_classifier.predict(X_test)

accuracy = accuracy_score(y_test, y_pred) * 100


print("Accuracy of the model: {:.2f}%".format(accuracy))
```

```
Accuracy of the model: 79.31%
```

In [29]:

```
from joblib import dump

# Assuming you have trained the Random Forest Classifier and stored it in th

# Save the model to a file
dump(rf_classifier, 'random_forest_model.joblib')
```

Out[29]:

```
['random_forest_model.joblib']
```

Handling test data

In [30]:

```
test_data = pd.read_csv('test.csv')
```

In [31]:

```
test_data.head()
```

Out[31]:

	PassengerId	HomePlanet	CryoSleep	Cabin	Destination	Age	VIP	RoomService
0	0013_01	Earth	True	G/3/S	TRAPPIST-1e	27.0	False	0.0
1	0018_01	Earth	False	F/4/S	TRAPPIST-1e	19.0	False	0.0
2	0019_01	Europa	True	C/0/S	55 Cancri e	31.0	False	0.0
3	0021_01	Europa	False	C/1/S	TRAPPIST-1e	38.0	False	0.0
4	0023_01	Earth	False	F/5/S	TRAPPIST-1e	20.0	False	10.0

In [32]:

```
test_data.dropna(inplace=True)
```

In [33]:

```
# getting all the columns with string/mixed type values
str_cols = list(test_data.columns)
str_cols.remove('Age')
str_cols.remove('RoomService')
str_cols.remove('FoodCourt')
str_cols.remove('ShoppingMall')
str_cols.remove('Spa')
str_cols.remove('VRDeck')
```

In [34]:
```
for i in str_cols:
    if test_data[i].dtype == 'object':
        test_data[i] = test_data[i].astype(str).str.strip()
```

In [35]:
```
test_data.isna().sum()
```

Out[35]:
```
PassengerId     0
HomePlanet      0
CryoSleep       0
Cabin           0
Destination     0
Age             0
VIP             0
RoomService     0
FoodCourt       0
ShoppingMall    0
Spa             0
VRDeck          0
Name            0
dtype: int64
```

Model on Test Data

In [36]:
```
test_features = test_data[['HomePlanet', 'CryoSleep', 'Destination', 'Age',

# Perform feature encoding on the test data
test_features_encoded = pd.get_dummies(test_features)
```

In [37]:
```
from joblib import load

rf_classifier = load('random_forest_model.joblib')
```

In [38]:
```
test_predictions = rf_classifier.predict(test_features_encoded)
```

In [39]:
```
test_data['Transported'] = test_predictions
print(test_data[['PassengerId', 'Transported']])
```

```
     PassengerId  Transported
0        0013_01         True
1        0018_01        False
2        0019_01         True
3        0021_01         True
4        0023_01        False
...          ...          ...
4269     9263_01         True
4270     9265_01         True
4271     9266_01         True
4272     9266_02        False
4276     9277_01        False

[3281 rows x 2 columns]
```

In [40]:

```
submission_data = test_data[['PassengerId', 'Transported']].copy()
```

In [41]:

```
submission_data
```

Out[41]:

```
      PassengerId  Transported
   0      0013_01         True
   1      0018_01        False
   2      0019_01         True
   3      0021_01         True
   4      0023_01        False
 ...          ...          ...
4269      9263_01         True
4270      9265_01         True
4271      9266_01         True
4272      9266_02        False
4276      9277_01        False

3281 rows × 2 columns
```

In [42]:

```
submission_data.to_csv('submission_data.csv', index=False)
```