Summer Olympics Analysis

About Dataset:

- This dataset is a list of all the medal winners in the Summer Olympics from 1976 Montreal to 2008 Beijing. It includes each and every medal awarded within the period. Further, this dataset can also be used for a predictive model as to which country is likely to fetch the highest number of gold in a particular sports category (just an example), etc. Dataset include:
- ● City: The city where the Olympics took place.
- ● Year: The year of the Olympics.
- ● Sport: The sport the event is categorized under.
- ● Discipline: A subcategory of the sport.
- ● Event: The specific event within a discipline.
- ● Athlete: The name of the athlete who participated.
- ● Gender: The gender of the athlete.
- ● Country_Code: The country code (abbreviation).
- ● Country: The full name of the country.
- ● Event_gender: The gender category of the event.
- ● Medal: The medal won (Gold, Silver, Bronze).

Objective:

- The primary goal is to:
- 1. Analyze the dataset to understand trends in medal distribution.
- 2. Identify the top-performing countries and athletes.
- 3. Study the gender distribution of events and medals.
- 4. Visualize the data using Python.

Steps:

- 1. Data Preparation: ○ Import libraries. ○ Load the dataset. ○ Clean the dataset (handling missing values, if any).
- 2. Exploratory Data Analysis (EDA): ○ Summary statistics of the dataset. ○ Plot and analyze trends of medals across years. ○ Identify the top-performing athletes and countries.
- 3. Visualizing Key Insights: ○ Visualize the distribution of medals by country, year, and sport. ○ Analyze gender distribution in different sports/events.
- 4. Predictive Analysis: ○ Train a machine learning model to predict whether an athlete will win a medal based on their country, sport, and other attributes.

Loading Data:

```
df = pd.read_csv(r'C:\Users\HP\Downloads\Summer Olympic medals.csv', encoding='ISO-8859-1')
df
```

	City	Year	Sport	Discipline	Event	Athlete	Gender	Country_Code	Country	Event_gender	Medal
0	Montreal	1976.0	Aquatics	Diving	3m springboard	KÖHLER, Christa	Women	GDR	East Germany	W	Silver
1	Montreal	1976.0	Aquatics	Diving	3m springboard	KOSENKOV, Aleksandr	Men	URS	Soviet Union	M	Bronze
2	Montreal	1976.0	Aquatics	Diving	3m springboard	BOGGS, Philip George	Men	USA	United States	M	Gold
3	Montreal	1976.0	Aquatics	Diving	3m springboard	CAGNOTTO, Giorgio Franco	Men	ITA	Italy	M	Silver
4	Montreal	1976.0	Aquatics	Diving	10m platform	WILSON, Deborah Keplar	Women	USA	United States	W	Bronze
...	...	...	...	...	...	...	...	...	...	...	...
15428	Beijing	2008.0	Wrestling	Wrestling Gre-R	66 - 74kg	GUENOT, Christophe	Men	FRA	France	M	Bronze
15429	Beijing	2008.0	Wrestling	Wrestling Gre-R	66 - 74kg	KVIRKELIA, Manuchar	Men	GEO	Georgia	M	Gold
15430	Beijing	2008.0	Wrestling	Wrestling Gre-R	55 - 60kg	RAHIMOV, Vitaliy	Men	AZE	Azerbaijan	M	Silver
15431	Beijing	2008.0	Wrestling	Wrestling Gre-R	60 - 66kg	GUENOT, Steeve	Men	FRA	France	M	Gold
15432	Beijing	2008.0	Wrestling	Wrestling Gre-R	96 - 120kg	LOPEZ, Mijain	Men	CUB	Cuba	M	Gold

15433 rows × 11 columns

Reviewing Data:

```
df.columns
```

```
Index(['City', 'Year', 'Sport', 'Discipline', 'Event', 'Athlete', 'Gender',
       'Country_Code', 'Country', 'Event_gender', 'Medal'],
      dtype='object')
```

```
df.nunique()
```

```
City              9
Year              9
Sport            28
Discipline       41
Event           293
Athlete       11337
Gender            2
Country_Code    128
Country         127
Event_gender      3
Medal             3
dtype: int64
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15433 entries, 0 to 15432
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   City          15316 non-null  object
 1   Year          15316 non-null  float64
 2   Sport         15316 non-null  object
 3   Discipline    15316 non-null  object
 4   Event         15316 non-null  object
 5   Athlete       15316 non-null  object
 6   Gender        15316 non-null  object
 7   Country_Code  15316 non-null  object
 8   Country       15316 non-null  object
 9   Event_gender  15316 non-null  object
 10  Medal         15316 non-null  object
dtypes: float64(1), object(10)
memory usage: 1.3+ MB
```

Data Cleaning:

Handling Missing Values:

```
df.isnull().sum()
```

```
City            117
Year            117
Sport           117
Discipline      117
Event           117
Athlete         117
Gender          117
Country_Code    117
Country         117
Event_gender    117
Medal           117
dtype: int64
```

```
df = df.dropna(how = 'all')
```

```
df.isnull().sum()
```

```
City            0
Year            0
Sport           0
Discipline      0
Event           0
Athlete         0
Gender          0
Country_Code    0
Country         0
```

Remove Duplicates and change data type:

```
df.duplicated().sum()
```

```
np.int64(1)
```

```
df = df.drop_duplicates()
```

```
df.duplicated().sum()
```

```
np.int64(0)
```

```
df = df.astype({'Year':'int'})
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 15315 entries, 0 to 15432
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   City          15315 non-null  object
 1   Year          15315 non-null  int64
 2   Sport         15315 non-null  int64
 3   Discipline    15315 non-null  object
 4   Event         15315 non-null  object
 5   Athlete       15315 non-null  object
 6   Gender        15315 non-null  int64
 7   Country_Code  15315 non-null  int64
```

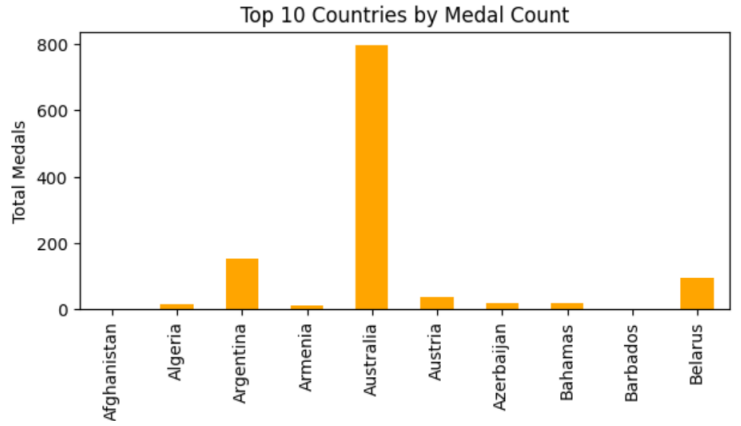
Data Exploration:

Medals by country:

```
con_medal = df.groupby('Country')['Medal'].count()
con_medal
```

```
Country
Afghanistan          1
Algeria             14
Argentina          153
Armenia              9
Australia          798
                   ...
Virgin Islands*      1
West Germany       345
Yugoslavia         278
Zambia               2
Zimbabwe            23
Name: Medal, Length: 127, dtype: int64
```

```
plt.figure(figsize=(7, 3))
con_medal.head(10).plot(kind='bar', color='orange')
plt.title("Top 10 Countries by Medal Count")
plt.xlabel("Country")
plt.ylabel("Total Medals")
plt.show()
```

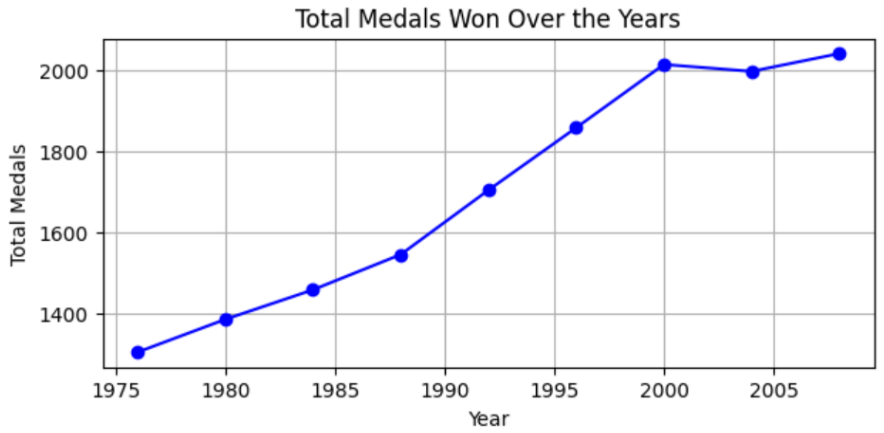


Medals Won Over the Years:

```
year_medal = df.groupby('Year')['Medal'].count()
year_medal
```

```
Year
1976.0    1305
1980.0    1386
1984.0    1459
1988.0    1546
1992.0    1705
1996.0    1859
2000.0    2015
2004.0    1998
2008.0    2042
Name: Medal, dtype: int64
```

```
plt.figure(figsize=(7, 3))
plt.plot(year_medal.index, year_medal.values,marker='o', linestyle='-', color='b')
plt.title("Total Medals Won Over the Years")
plt.xlabel("Year")
plt.ylabel("Total Medals")
plt.grid(True)
plt.show()
```

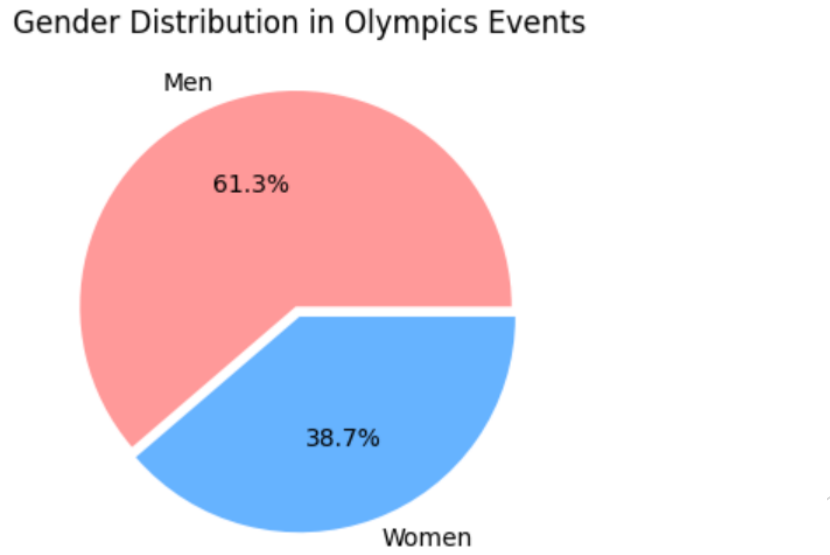


Gender distribution in events:

```
gn = df['Gender'].value_counts()
gn
```

```
Gender
Men      9388
Women    5928
Name: count, dtype: int64
```

```
plt.figure(figsize=(6, 4))
gn.plot(kind='pie', autopct='%1.1f%%',
colors=['#ff9999','#66b3ff'], explode=[0.05, 0])
plt.title("Gender Distribution in Olympics Events")
plt.ylabel('')
plt.show()
```

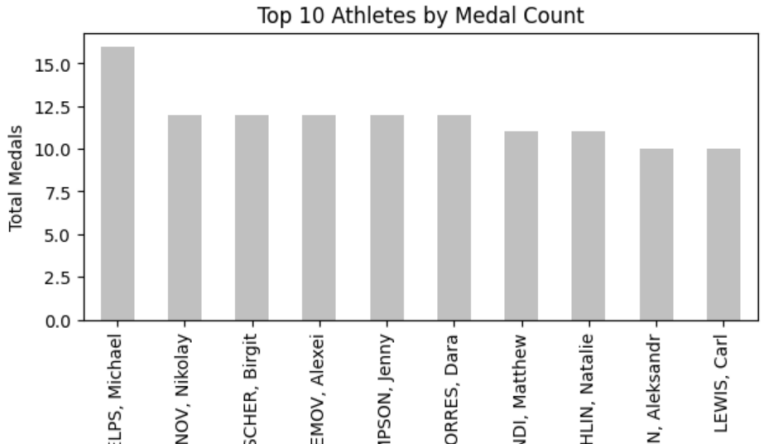


Top Athletes with Most Medals:

```
at = df.groupby('Athlete')['Medal'].count().sort_values(ascending=False)
at
```

```
Athlete
PHELPS, Michael        16
FISCHER, Birgit        12
TORRES, Dara           12
THOMPSON, Jenny        12
ANDRIANOV, Nikolay     12
                       ..
ZVYAGINTSEV, Viktor     1
ZWEHL, Julia            1
ZWERING, Klaas-Erik     1
ZUEVA, Natalia          1
ZUIJDWEG, Martijn       1
Name: Medal, Length: 11337, dtype: int64
```

```
plt.figure(figsize=(7, 3))
at.head(10).plot(kind='bar', color='silver')
plt.title("Top 10 Athletes by Medal Count")
plt.xlabel("Athlete")
plt.ylabel("Total Medals")
plt.show()
```



Predictive Analysis:

Encode categorical variables using
Label Encoder:

```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, confusion_matrix,classification_report
```

```
le = LabelEncoder()
df['Country_Code'] = le.fit_transform(df['Country_Code'])
df['Sport'] = le.fit_transform(df['Sport'])
df['Gender'] = le.fit_transform(df['Gender'])
df['Event_gender'] =le.fit_transform(df['Event_gender'])
df['Medal'] = df['Medal'].map({'Gold': 1,'Silver': 1, 'Bronze': 1})
```

Features and target:

```
X = df[['Country_Code', 'Sport', 'Gender','Event_gender']]
y = df['Medal']
```

Split the dataset into training and testing sets:

```
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.3, random_state=42)
```

Initialize and train a logistic regression model:

```
model = LogisticRegression()
model.fit(X_train, y_train)
```

Predict on the test data:

```
y_pred = model.predict(X_test)
```

Model evaluation:

```
print("Accuracy Score:", accuracy_score(y_test, y_pred))
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred))
print("Classification Report:\n", classification_report(y_test,
y_pred))
```

Insights:

- 1.Australia emerged as the top-performing country in this timeframe, securing the most medals overallfollowed by Argentina.
- 2.The 2008 Summer Olympics recorded the highest number of medals won, indicating a significant level of competition and participation during that year.
- 3.Across the analyzed period, male athletes won more medals compared to female athletes, reflecting a notable gender disparity in the competitions.
- 4.Michael Phelps stood out as the most successful athlete, dominating the medal tally with his extraordinary performances.