```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df = pd.read_csv('aerofit_treadmill.csv')
```

```
df.head()
```

	Product	Age	Gender	Education	MaritalStatus	Usage	Fitness	Income	Miles
0	KP281	18	Male	14	Single	3	4	29562	112
1	KP281	19	Male	15	Single	2	3	31836	75
2	KP281	19	Female	14	Partnered	4	3	30699	66
3	KP281	19	Male	12	Single	3	3	32973	85
4	KP281	20	Male	13	Partnered	4	2	35247	47

```
df.describe()
```

	Age	Education	Usage	Fitness	Income	Miles
count	180.000000	180.000000	180.000000	180.000000	180.000000	180.000000
mean	28.788889	15.572222	3.455556	3.311111	53719.577778	103.194444
std	6.943498	1.617055	1.084797	0.958869	16506.684226	51.863605
min	18.000000	12.000000	2.000000	1.000000	29562.000000	21.000000
25%	24.000000	14.000000	3.000000	3.000000	44058.750000	66.000000
50%	26.000000	16.000000	3.000000	3.000000	50596.500000	94.000000
75%	33.000000	16.000000	4.000000	4.000000	58668.000000	114.750000
max	50.000000	21.000000	7.000000	5.000000	104581.000000	360.000000

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 180 entries, 0 to 179
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   Product        180 non-null    object
 1   Age            180 non-null    int64 
 2   Gender         180 non-null    object
```

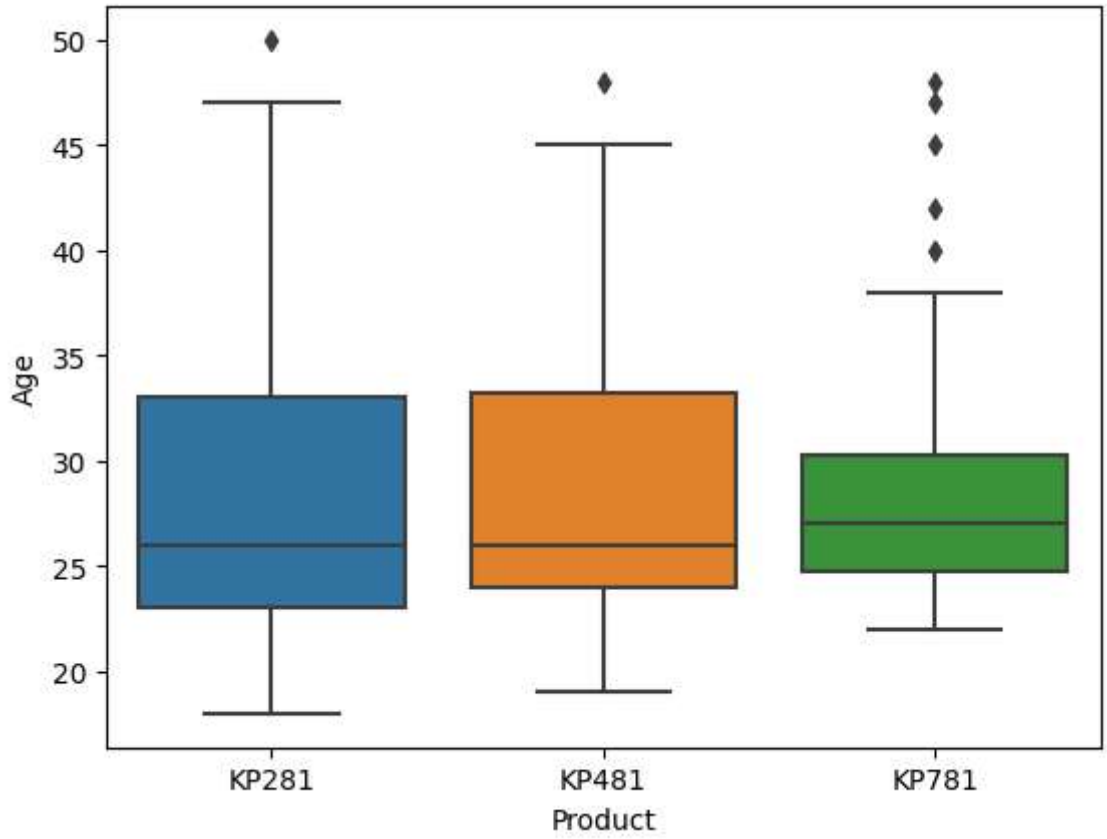
```
 3   Education      180 non-null    int64
 4   MaritalStatus  180 non-null    object
 5   Usage          180 non-null    int64
 6   Fitness        180 non-null    int64
 7   Income         180 non-null    int64
 8   Miles          180 non-null    int64
dtypes: int64(6), object(3)
memory usage: 12.8+ KB
```

```
df.shape
```

```
(180, 9)
```

2. Detect outliers

```
sns.boxplot(x=df['Product'], y=df['Age'])
plt.show()
```



The KP281 is an entry-level treadmill that sells for $1,500 is majorly bought by the majority of the ages between 23 to 34 and has a peak for the age$ $where as the The KP481 is for mid-level runners that sell for$ 1,750 is bought by people of ages ranging from 25 to to 34 majorly. The KP781 treadmill is having

advanced features that sell for $2,500 is comparitively less in sales and is mostly bought by people between the age 26 and 30 and a very few till the age of 45

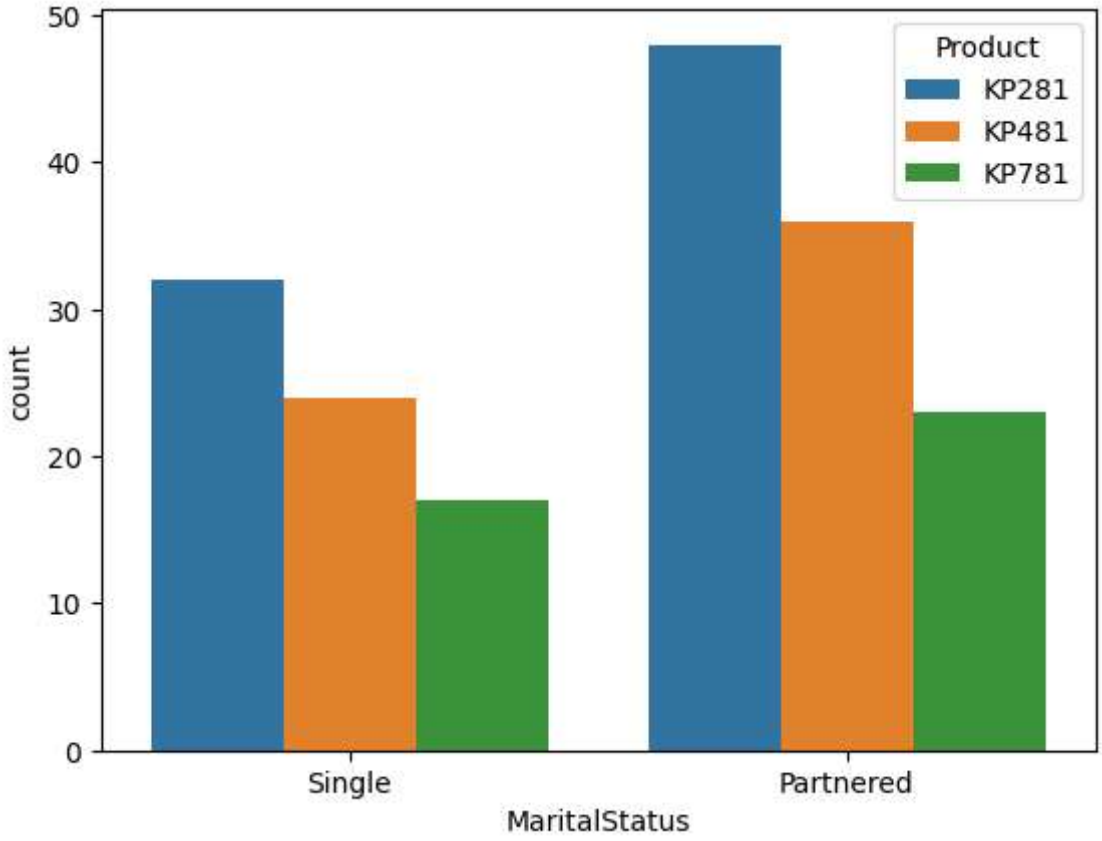
difference between mean and median for numerical columns

```
print(df.describe())
```

```
                Age   Education       Usage     Fitness         Income  \
count  180.000000  180.000000  180.000000  180.000000     180.000000
mean    28.788889   15.572222    3.455556    3.311111   53719.577778
std      6.943498    1.617055    1.084797    0.958869   16506.684226
min     18.000000   12.000000    2.000000    1.000000   29562.000000
25%     24.000000   14.000000    3.000000    3.000000   44058.750000
50%     26.000000   16.000000    3.000000    3.000000   50596.500000
75%     33.000000   16.000000    4.000000    4.000000   58668.000000
max     50.000000   21.000000    7.000000    5.000000  104581.000000

            Miles
count  180.000000
mean   103.194444
std     51.863605
min     21.000000
25%     66.000000
50%     94.000000
75%    114.750000
max    360.000000
```

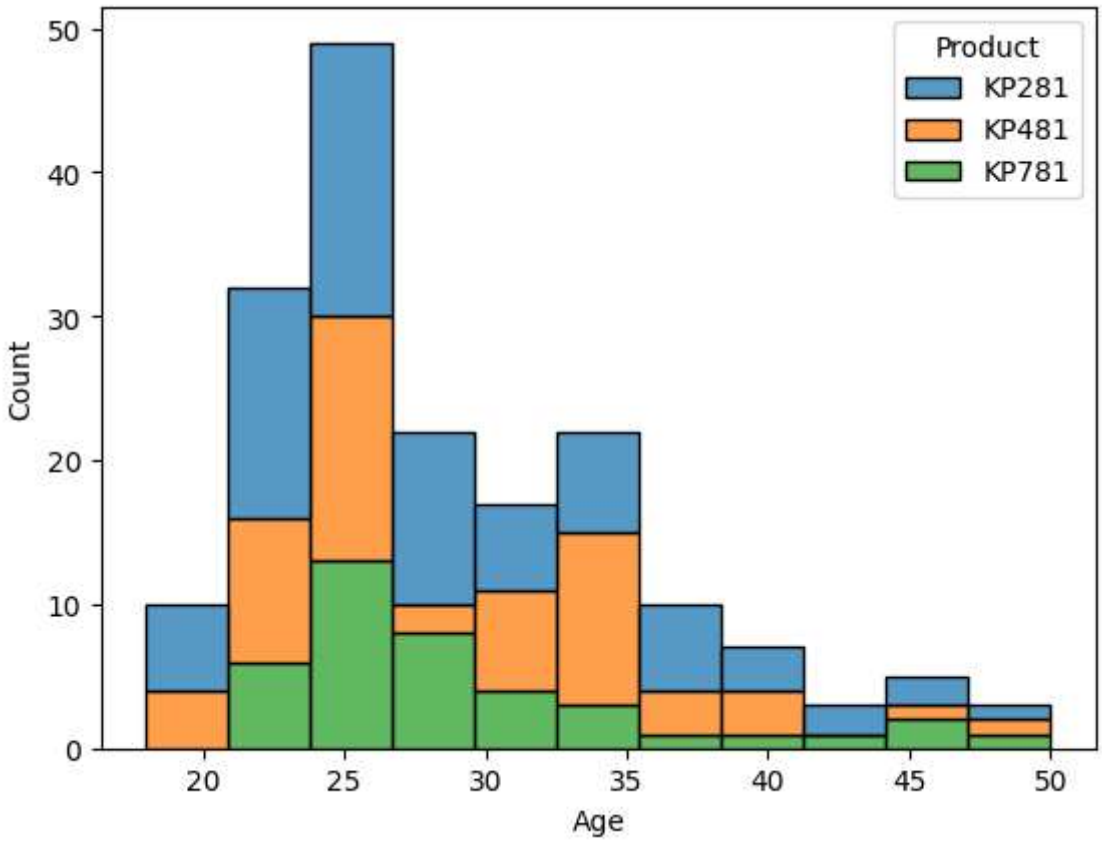
Exploring the effect of features on product purchased

```
# Countplot for marital status and product purchased
sns.countplot(x='MaritalStatus', hue='Product', data=df)
plt.show()
```



The people purchasing the tredmills are mostly the partnered once when compared to single one's as seen from the graph

```
# Histplot for age and product purchased
sns.histplot(x='Age', hue='Product', data=df, multiple='stack')
plt.show()
```



The entry level KP281 is amongst the most selling tredmills especially between at the age of 25 and also overall as it tops the sales amongst all age group because of its pricing and also the KP481 and KP781 is also having the most sales amongst people pf age 25 as they are the ones into fitness and want an upgraded device which is shown clearly

4. Represent marginal probabilities

```
# Pandas crosstab for marginal probabilities
marginal_prob = pd.crosstab(index=df['Product'], columns='count', normalize=True)
print(marginal_prob)
```

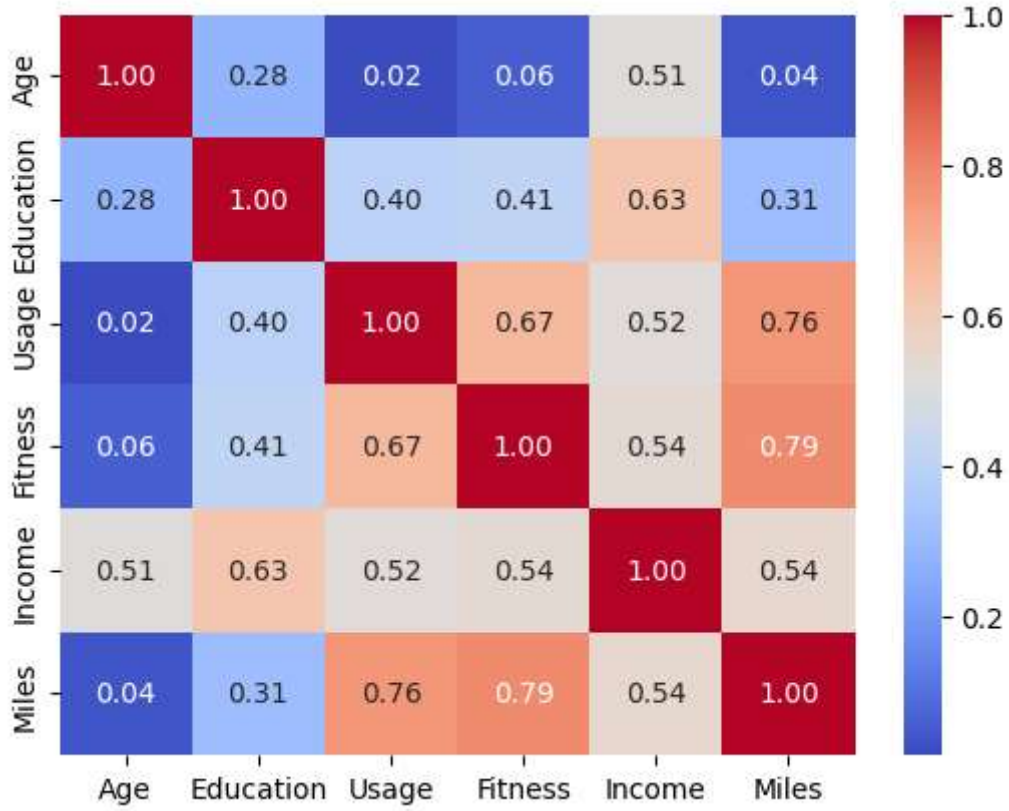
```
col_0       count
Product
KP281    0.444444
KP481    0.333333
KP781    0.222222
```

From this we can easily conclude that the one with the lower price has the higher number of sales and the others following them in a lesser percentage

5. Check correlation

```
# Heatmap for correlation
sns.heatmap(df.corr(), annot=True, cmap='coolwarm', fmt=".2f")
plt.show()
```

```
<ipython-input-16-387dae86a4ad>:2: FutureWarning: The default value of numeric_only in D
  sns.heatmap(df.corr(), annot=True, cmap='coolwarm', fmt=".2f")
```




```
# Pairplot for visualizing relationships
sns.pairplot(df, hue='Product')
plt.show()
```


Age
Education
Usage
Fitness
Income
Miles
Product
KP281
KP481
KP781

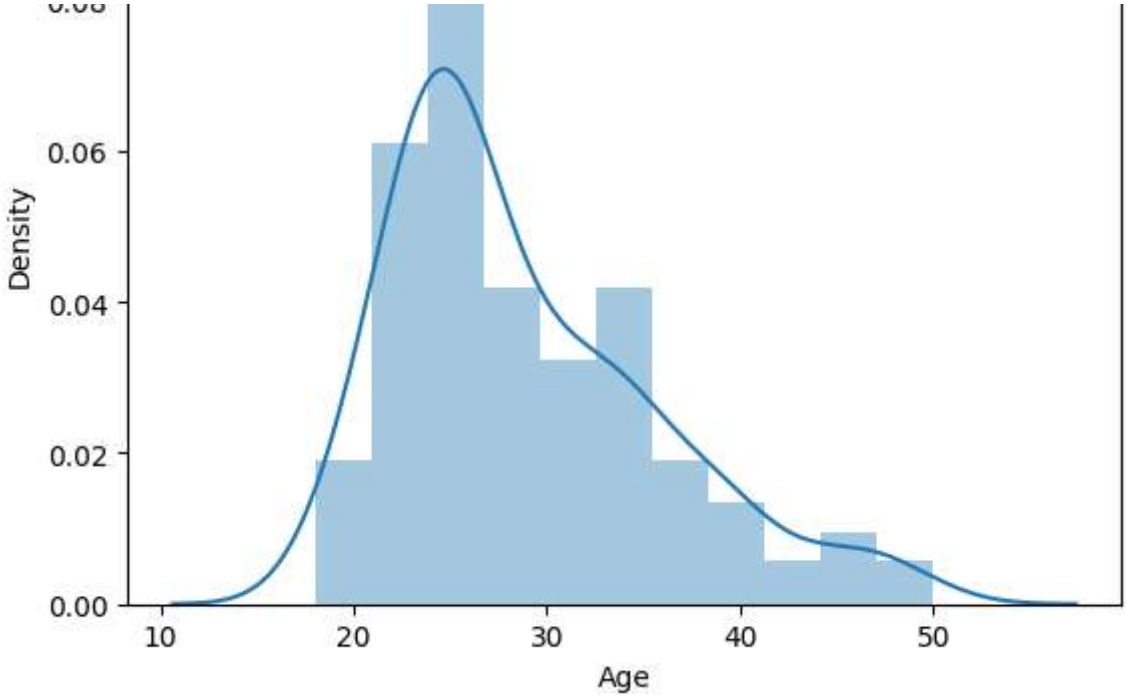
Unique values and counts for categorical variables

```
for column in df.select_dtypes(include=['object']).columns:
    print(f"Attribute: {column}")
    print(df[column].value_counts())
    print("\n")
```

```
Attribute: Product
KP281    80
KP481    60
KP781    40
Name: Product, dtype: int64


Attribute: Gender
Male      104
Female     76
Name: Gender, dtype: int64


Attribute: MaritalStatus
Partnered    107
Single        73
Name: MaritalStatus, dtype: int64
```

Univariate analysis for continuous variables

```
sns.distplot(df['Age'])
plt.show()

sns.distplot(df['Income'])
plt.show()
```




```
<ipython-input-14-057200d01f76>:4: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
```

```
  sns.distplot(df['Income'])
```