ZEOTAP PDF:

```
# Importing necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from datetime import datetime

# Set display options for better readability
pd.set_option('display.max_columns', None)

# Load the datasets
customers = pd.read_csv('Customers.csv')
products = pd.read_csv('Products.csv')
transactions = pd.read_csv('Transactions.csv')

# Preview datasets
print(customers.head())
print(products.head())
print(transactions.head())
```

output:

```
 CustomerID       CustomerName         Region  SignupDate
0      C0001    Lawrence Carroll  South America  2022-07-10
1      C0002      Elizabeth Lutz           Asia  2022-02-13
2      C0003      Michael Rivera  South America  2024-03-07
3      C0004  Kathleen Rodriguez  South America  2022-10-09
4      C0005        Laura Weber           Asia  2022-08-15
  ProductID              ProductName     Category   Price
0      P001     ActiveWear Biography        Books  169.30
1      P002    ActiveWear Smartwatch  Electronics  346.30
```

2 P003 ComfortLiving Biography Books 44.12

3 P004 BookWorld Rug Home Decor 95.69

4 P005 TechPro T-Shirt Clothing 429.31

	TransactionID	CustomerID	ProductID	TransactionDate	Quantity	\
0	T00001	C0199	P067	2024-08-25 12:38:23	1	
1	T00112	C0146	P067	2024-05-27 22:23:54	1	
2	T00166	C0127	P067	2024-04-25 07:38:55	1	
3	T00272	C0087	P067	2024-03-26 22:55:37	2	
4	T00363	C0070	P067	2024-03-21 15:10:10	3	

	TotalValue	Price
0	300.68	300.68
1	300.68	300.68
2	300.68	300.68
3	601.36	300.68
4	902.04	300.68

[4]:

```
# Checking for missing values
print(customers.isnull().sum())
print(products.isnull().sum())
print(transactions.isnull().sum())

# Convert dates to datetime format
customers['SignupDate'] = pd.to_datetime(customers['SignupDate'])
transactions['TransactionDate'] = pd.to_datetime(transactions['TransactionDate'])

# Removing duplicates if any
customers = customers.drop_duplicates()
products = products.drop_duplicates()
transactions = transactions.drop_duplicates()
```

```
# Validate data types
print(customers.info())
print(products.info())
print(transactions.info())

output:
CustomerID      0
CustomerName    0
Region          0
SignupDate      0
dtype: int64
ProductID      0
ProductName    0
Category       0
Price          0
dtype: int64
TransactionID      0
CustomerID         0
ProductID          0
TransactionDate    0
Quantity           0
TotalValue         0
Price              0
dtype: int64
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   CustomerID   200 non-null    object
```

```
 1   CustomerName  200 non-null    object
 2   Region        200 non-null    object
 3   SignupDate    200 non-null    datetime64[ns]
dtypes: datetime64[ns](1), object(3)
memory usage: 6.4+ KB
None
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 4 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   ProductID    100 non-null    object
 1   ProductName  100 non-null    object
 2   Category     100 non-null    object
 3   Price        100 non-null    float64
dtypes: float64(1), object(3)
memory usage: 3.3+ KB
None
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 7 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   TransactionID   1000 non-null   object
 1   CustomerID      1000 non-null   object
 2   ProductID       1000 non-null   object
 3   TransactionDate  1000 non-null   datetime64[ns]
 4   Quantity        1000 non-null   int64
 5   TotalValue      1000 non-null   float64
 6   Price           1000 non-null   float64
dtypes: datetime64[ns](1), float64(2), int64(1), object(3)
```

memory usage: 54.8+ KB

Merging transaction and product data for analysis

merged_data = pd.merge(transactions, products, on='ProductID')

Calculate top-selling products by quantity

top_products =
merged_data.groupby('ProductName')['Quantity'].sum().sort_values(ascending=False).head(10)

Visualization

plt.figure(figsize=(10, 6))

sns.barplot(x=top_products.values, y=top_products.index, palette='viridis')

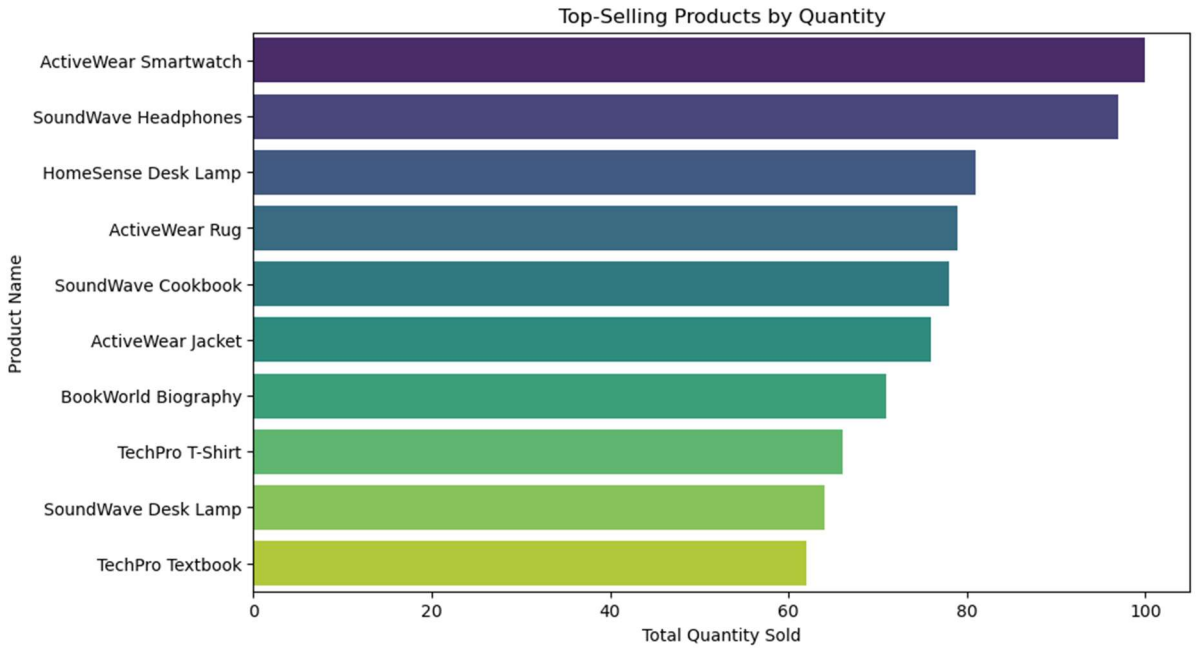
plt.title('Top-Selling Products by Quantity')

plt.xlabel('Total Quantity Sold')

plt.ylabel('Product Name')

plt.show()

output:



Extract year from SignupDate

customers['SignupYear'] = customers['SignupDate'].dt.year

```
# Count customers by signup year
active_customers = customers['SignupYear'].value_counts().sort_index()

# Visualization
plt.figure(figsize=(10, 6))
sns.lineplot(x=active_customers.index, y=active_customers.values, marker='o', color='b')
plt.title('Active Customers by Signup Year')
plt.xlabel('Year')
plt.ylabel('Number of Customers')
plt.grid()
plt.show()
```

output: