In [ ]:

REGRESSION PROJECT_Avocado Data Analysis

Comparison of all Regression Models_ Avocado Data Analysis

In [55]:
```
#display image using python
from IPython.display import Image
url = 'E:\Data Science & AI\Dataset files\Fruit.jpg'
Image(url,height=200,width=900)
```

```
<>:3: SyntaxWarning: invalid escape sequence '\D'
<>:3: SyntaxWarning: invalid escape sequence '\D'
C:\Users\roy62\AppData\Local\Temp\ipykernel_13772\81040572.py:3: SyntaxWarning: i
nvalid escape sequence '\D'
  url = 'E:\Data Science & AI\Dataset files\Fruit.jpg'
```

Out[55]:

In [57]:
```
#importing libraries

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
import warnings
warnings.filterwarnings('ignore')
```

In [58]:
```
#importing the dataset
data = pd.read_csv(r'E:\Data Science & AI\Dataset files\avocado.csv',index_col=0
data.info()
```

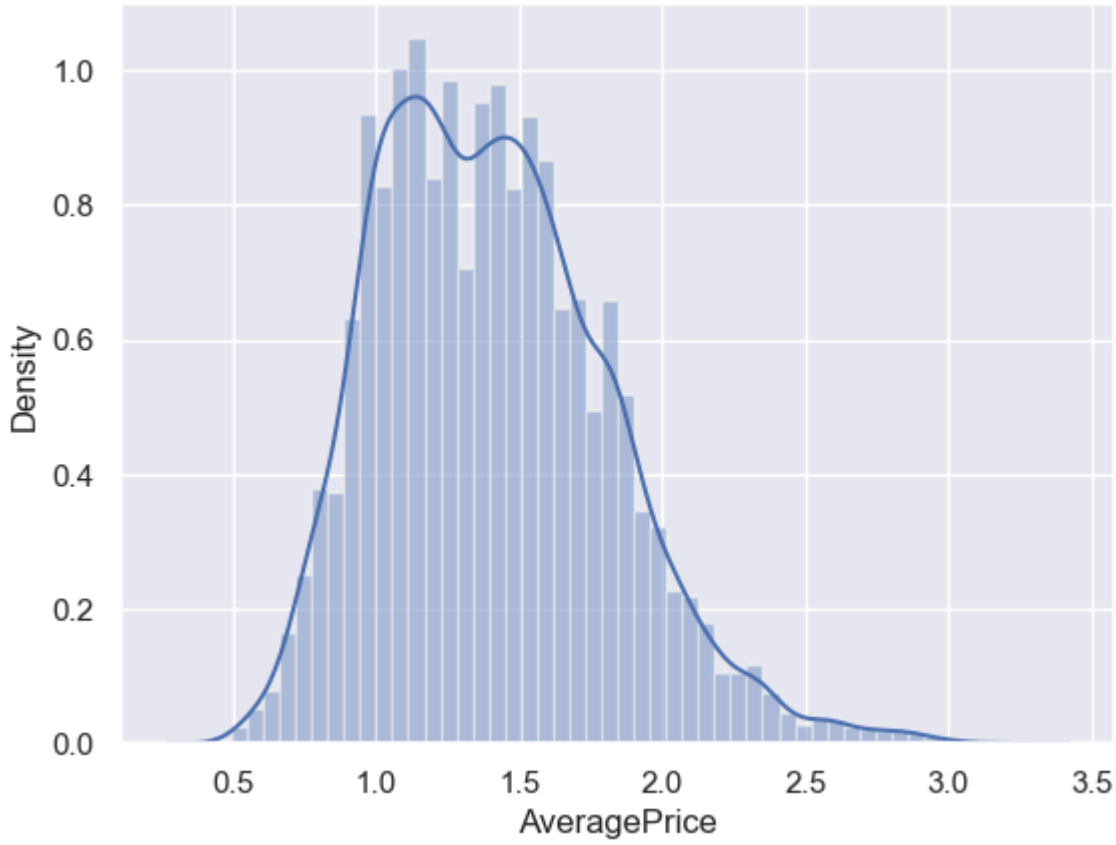
```
<class 'pandas.core.frame.DataFrame'>
Index: 18249 entries, 0 to 11
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Date          18249 non-null  object
 1   AveragePrice  18249 non-null  float64
 2   Total Volume  18249 non-null  float64
 3   4046          18249 non-null  float64
 4   4225          18249 non-null  float64
 5   4770          18249 non-null  float64
 6   Total Bags    18249 non-null  float64
 7   Small Bags    18249 non-null  float64
 8   Large Bags    18249 non-null  float64
 9   XLarge Bags   18249 non-null  float64
 10  type          18249 non-null  object
 11  year          18249 non-null  int64
 12  region        18249 non-null  object
dtypes: float64(9), int64(1), object(3)
memory usage: 1.9+ MB
```

In [59]:
```
data.head(3)
```

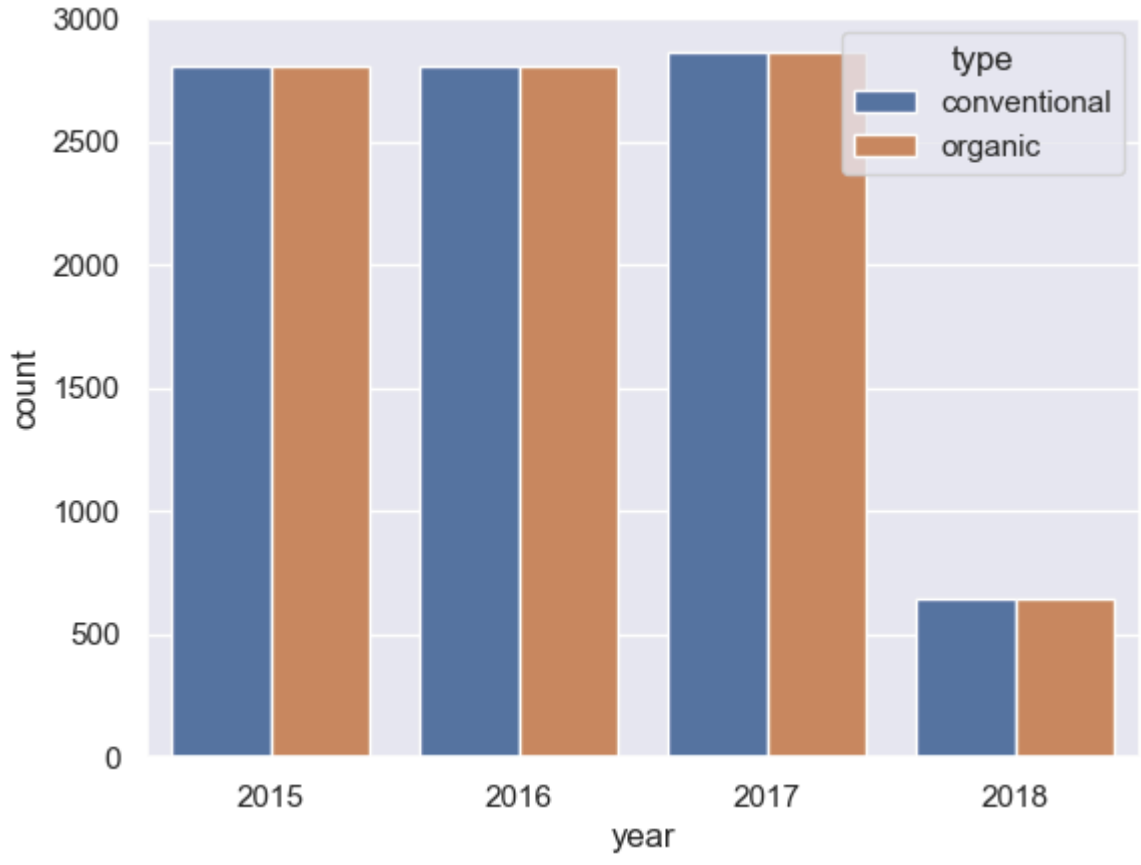
Out[59]:

	Date	AveragePrice	Total Volume	4046	4225	4770	Total Bags	Small Bags	Large Bags
0	2015-12-27	1.33	64236.62	1036.74	54454.85	48.16	8696.87	8603.62	93.25
1	2015-12-20	1.35	54876.98	674.28	44638.81	58.33	9505.56	9408.07	97.49
2	2015-12-13	0.93	118220.22	794.70	109149.67	130.50	8145.35	8042.21	103.14

In [60]:
```
sns.distplot(data['AveragePrice']);
```



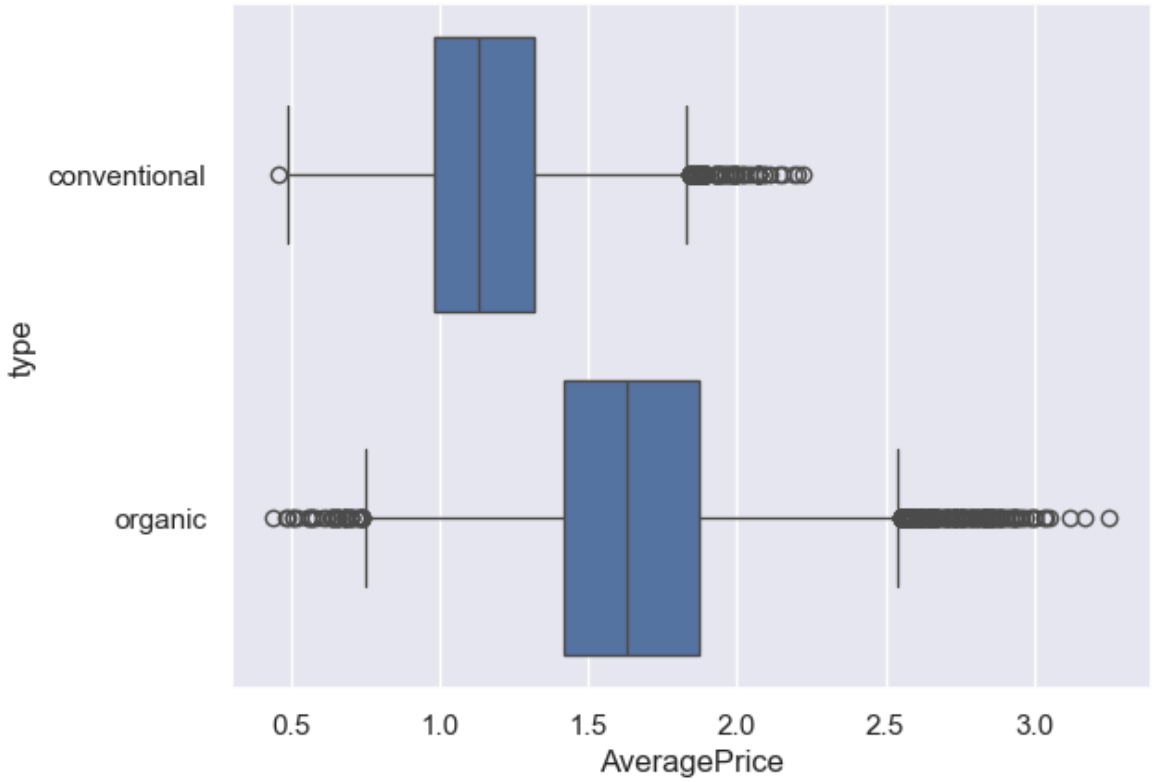
In [61]:
```
sns.countplot(x='year',data=data,hue='type');
```



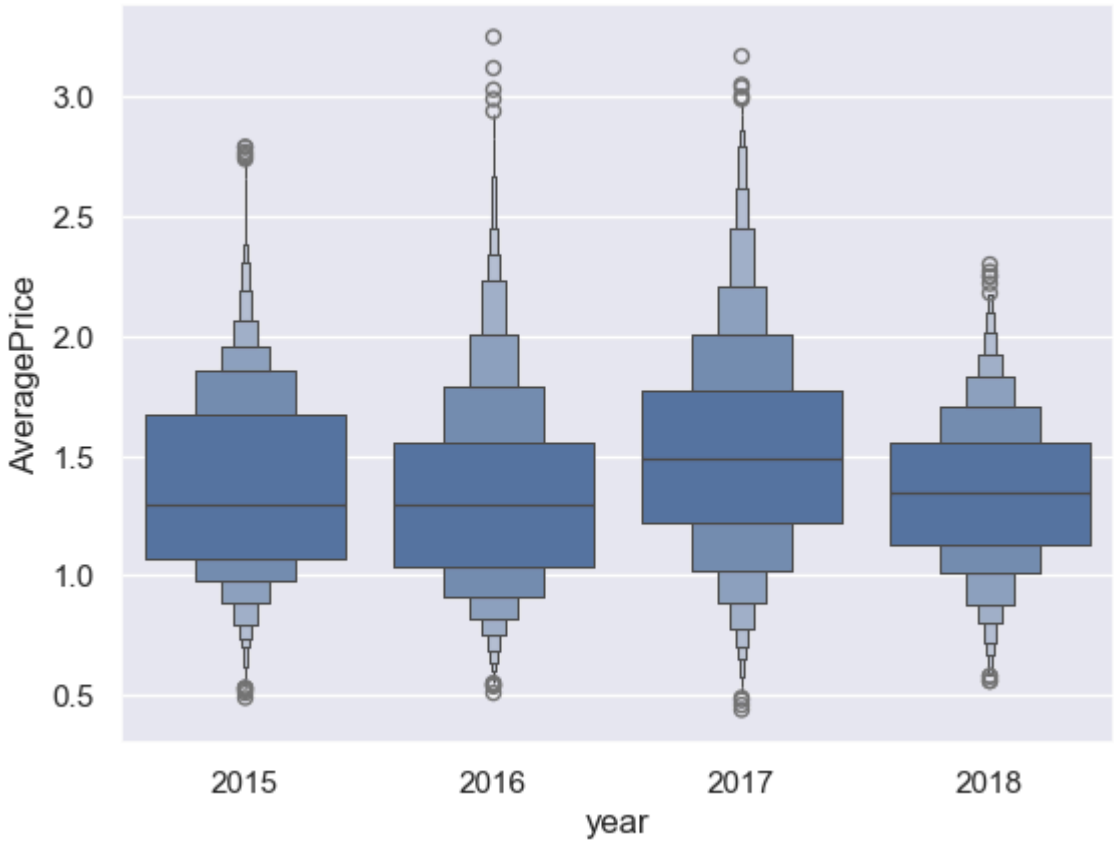
In [62]:
```
data.year.value_counts()
```

Out[62]:
```
year
2017    5722
2016    5616
2015    5615
2018    1296
Name: count, dtype: int64
```

In [63]:
```
sns.boxplot(y="type", x="AveragePrice", data=data);
```



In [64]:
```
data.year=data.year.apply(str)
sns.boxenplot(x="year", y="AveragePrice", data=data);
```

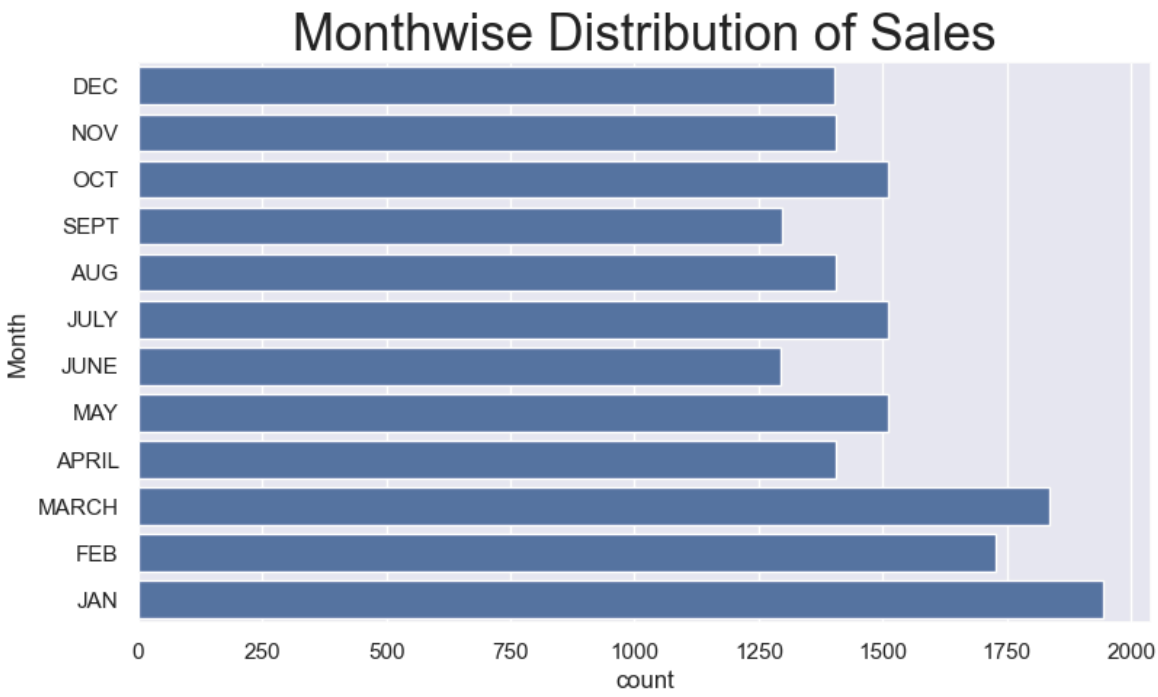


In [65]:
```
# Dealing with categorical features

data['type']= data['type'].map({'conventional':0,'organic':1})

# Extracting month from date column.
data.Date = data.Date.apply(pd.to_datetime)
data['Month']=data['Date'].apply(lambda x:x.month)
data.drop('Date',axis=1,inplace=True)
data.Month = data.Month.map({1:'JAN',2:'FEB',3:'MARCH',4:'APRIL',5:'MAY',6:'JUNE
```

In [66]:
```
plt.figure(figsize=(9,5))
sns.countplot(data['Month'])
plt.title('Monthwise Distribution of Sales',fontdict={'fontsize':25});
```



In [70]:
```
# Preparing data for ML models

# Creating dummy variables
dummies = pd.get_dummies(data[['year','region','Month']],drop_first=True)
df_dummies = pd.concat([data[['Total Volume', '4046', '4225', '4770', 'Total Bag
       'Small Bags', 'Large Bags', 'XLarge Bags', 'type']],dummies],axis=1)
target = data['AveragePrice']

# Splitting data into training and test set
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(df_dummies,target,test_size=

# Standardizing the data
cols_to_std = ['Total Volume', '4046', '4225', '4770', 'Total Bags', 'Small Bags
from sklearn.preprocessing import StandardScaler
scaler=StandardScaler()
scaler.fit(X_train[cols_to_std])
X_train[cols_to_std] = scaler.transform(X_train[cols_to_std])
X_test[cols_to_std] = scaler.transform(X_test[cols_to_std])
```

In [72]:
```
#importing ML models from scikit-learn
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.svm import SVR
from sklearn.neighbors import KNeighborsRegressor
from sklearn.metrics import mean_absolute_error,mean_squared_error,r2_score
```

In [73]:
```
#to save time all models can be applied once using for loop
regressors = {
    'Linear Regression' : LinearRegression(),
    'Decision Tree' : DecisionTreeRegressor(),
    'Random Forest' : RandomForestRegressor(),
    'Support Vector Machines' : SVR(gamma=1),
    'K-nearest Neighbors' : KNeighborsRegressor(n_neighbors=1),
}
results=pd.DataFrame(columns=['MAE','MSE','R2-score'])
```

```
for method,func in regressors.items():
    model = func.fit(X_train,y_train)
    pred = model.predict(X_test)
    results.loc[method]= [np.round(mean_absolute_error(y_test,pred),3),
                          np.round(mean_squared_error(y_test,pred),3),
                          np.round(r2_score(y_test,pred),3)
                         ]
```

In [76]:
```
# Deep Neural Network

# Splitting train set into training and validation sets.
X_train, X_val, y_train, y_val = train_test_split(X_train,y_train,test_size=0.20
```

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