Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[109]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

READING THE DATASET

[144]:
```
df = pd.read_csv(r"C:\Users\HP\OneDrive\Documents\Crop Production data.csv")
df.head()
```

[144]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
0	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Arecanut	1254.0	2000.0
1	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Other Kharif pulses	2.0	1.0
2	Andaman and Nicobar Islands	NICOBARS	2000	Kharif	Rice	102.0	321.0
3	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Banana	176.0	641.0
4	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year	Cashewnut	720.0	165.0

UNDERSTANDING THE DATA

[145]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 246091 entries, 0 to 246090
Data columns (total 7 columns):
 #   Column         Non-Null Count   Dtype
---  ------         --------------   -----
```

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

UNDERSTANDING THE DATA

[145]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 246091 entries, 0 to 246090
Data columns (total 7 columns):
 #   Column         Non-Null Count   Dtype  
---  ------         --------------   -----  
 0   State_Name     246091 non-null  object 
 1   District_Name  246091 non-null  object 
 2   Crop_Year      246091 non-null  int64  
 3   Season         246091 non-null  object 
 4   Crop           246091 non-null  object 
 5   Area           246091 non-null  float64
 6   Production     242361 non-null  float64
dtypes: float64(2), int64(1), object(4)
memory usage: 13.1+ MB
```

[146]:
```
df.describe()
```

[146]:

	Crop_Year	Area	Production
count	246091.000000	2.460910e+05	2.423610e+05
mean	2005.643018	1.200282e+04	5.825034e+05
std	4.952164	5.052340e+04	1.706581e+07
min	1997.000000	4.000000e-02	0.000000e+00
25%	2002.000000	8.000000e+01	8.800000e+01
50%	2006.000000	5.820000e+02	7.290000e+02
75%	2010.000000	4.392000e+03	7.023000e+03

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

std	4.952164	5.052340e+04	1.706581e+07
min	1997.000000	4.000000e-02	0.000000e+00
25%	2002.000000	8.000000e+01	8.800000e+01
50%	2006.000000	5.820000e+02	7.290000e+02
75%	2010.000000	4.392000e+03	7.023000e+03
max	2015.000000	8.580100e+06	1.250800e+09

[147]:
```
df.describe(include=object)
```

[147]:

	State_Name	District_Name	Season	Crop
count	246091	246091	246091	246091
unique	33	646	6	124
top	Uttar Pradesh	BIJAPUR	Kharif	Rice
freq	33306	945	95951	15104

[114]:
```
df.shape
```

[114]:
```
(246091, 7)
```

CHECKING FOR NULL VALUES

[115]:
```
df.isna().sum()
```

[115]:
```
State_Name          0
District_Name       0
```

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[115]:
```
df.isna().sum()
```

[115]:
```
State_Name          0
District_Name       0
Crop_Year           0
Season              0
Crop                0
Area                0
Production       3730
dtype: int64
```

DEALING WITH NULL VALUES

[116]:
```
df[df['Production'].isna()]
```

[116]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
46	Andaman and Nicobar Islands	NICOBARS	2005	Whole Year	Arecanut	795.67	NaN
51	Andaman and Nicobar Islands	NICOBARS	2005	Whole Year	Dry chillies	17.00	NaN
623	Andhra Pradesh	ANANTAPUR	2007	Kharif	Moong(Green Gram)	1000.00	NaN
630	Andhra Pradesh	ANANTAPUR	2007	Rabi	Horse-gram	1000.00	NaN
698	Andhra Pradesh	ANANTAPUR	2009	Rabi	Rapeseed &Mustard	8.00	NaN
...	...	...	...	...	...	...	...
244128	West Bengal	MEDINIPUR WEST	2010	Rabi	Peas & beans (Pulses)	2.00	NaN
244581	West Bengal	MURSHIDABAD	2006	Kharif	Moong(Green Gram)	200.00	NaN
245606	West Bengal	PURULIA	2001	Rabi	Rapeseed &Mustard	427.00	NaN
245644	West Bengal	PURULIA	2002	Rabi	Rapeseed &Mustard	522.00	NaN

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

...	...	...	...	...	...	...	...
244128	West Bengal	MEDINIPUR WEST	2010	Rabi	Peas & beans (Pulses)	2.00	NaN
244581	West Bengal	MURSHIDABAD	2006	Kharif	Moong(Green Gram)	200.00	NaN
245606	West Bengal	PURULIA	2001	Rabi	Rapeseed &Mustard	427.00	NaN
245644	West Bengal	PURULIA	2002	Rabi	Rapeseed &Mustard	522.00	NaN
245865	West Bengal	PURULIA	2008	Rabi	Khesari	2.00	NaN

3730 rows × 7 columns

[117]:
```
df['Production'].fillna(0, inplace=True)
df['Production'].isna().sum()
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\2512127675.py:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.


  df['Production'].fillna(0, inplace=True)
```

[117]:
```
0
```

CHECKING FOR DUPLICATES

[118]:
```
df.duplicated().sum()
```

[118]: 0

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[118]:
```
df.duplicated().sum()
```

[118]:
```
0
```

[ ]:

DROPPING INAPPROPRIATE ENTRIES AND NON USEFUL FEATURES

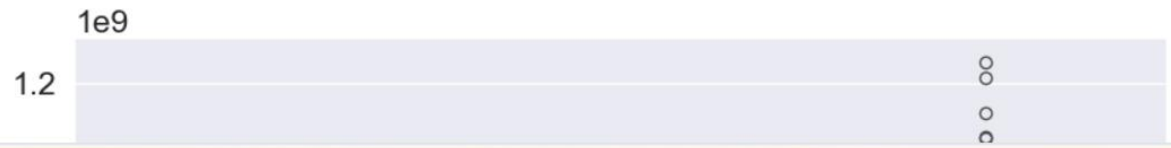
[119]:
```
df['Season'].value_counts()
```

[119]:
```
Season
Kharif         95951
Rabi           66987
Whole Year     57305
Summer         14841
Winter          6058
Autumn          4949
Name: count, dtype: int64
```

[120]:
```
df.drop(df[df['Season'] == 'Total'].index, inplace=True)
```

[121]:
```
plt.figure(figsize=(10, 5))
sns.boxplot(df)
```

[121]:
```
<Axes: >
```



90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

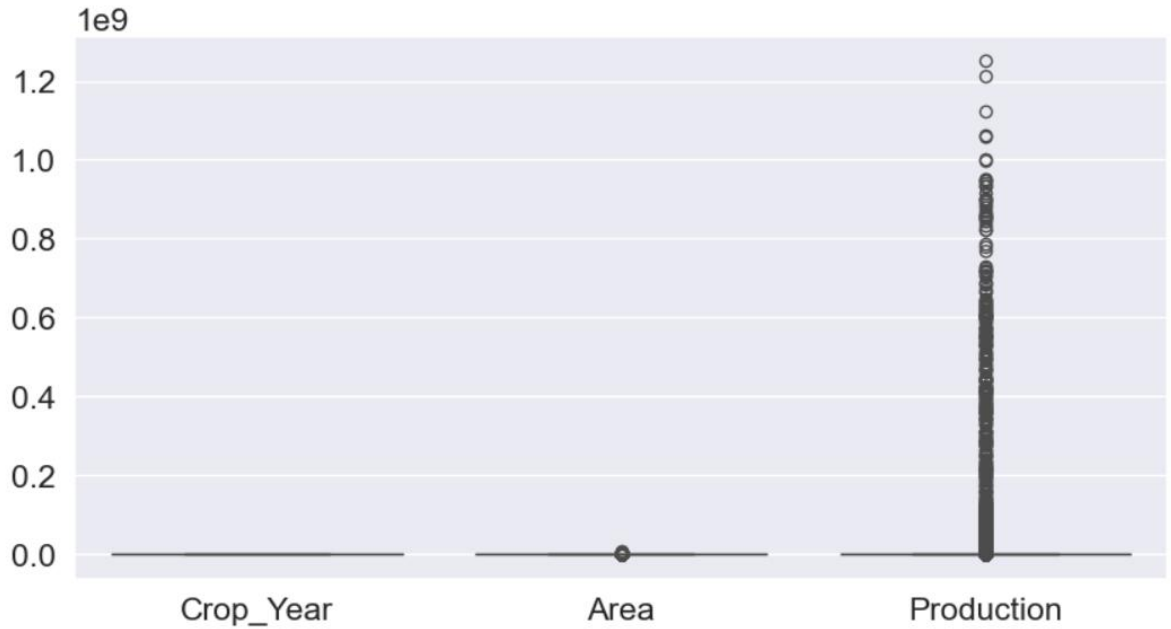
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[121]:
```
plt.figure(figsize=(10, 5))
sns.boxplot(df)
```

[121]: <Axes: >



EXPLORATORY DATA ANALYSIS(EDA)

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

EXPLORATORY DATA ANALYSIS(EDA)

[122]:
```
np.mean(df['Area'])
```

[122]:
```
12002.82086370489
```

[123]:
```
df.rename(columns={'State_Name': 'State and UT'}, inplace=True)
```

[124]:
```
DF = df.copy()
DF = DF.groupby(
    by='State and UT')['Area'].sum().reset_index().sort_values(
        by='Area', ascending=False)
DF.head()

fig, ax = plt.subplots(figsize=(15, 10))
sns.barplot(x=DF['State and UT'].head(5),
            y=DF['Area'].head(5),
            errwidth=0)
sns.set(font_scale=1.5)
plt.yscale('log')
plt.title('Agricultural Area Distribution - India')
DF.head(5)
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\1490598294.py:8: FutureWarning:

The `errwidth` parameter is deprecated. And will be removed in v0.15.0. Pass `err_kws={'linewidth': 0}` instead.

  sns.barplot(x=DF['State and UT'].head(5),
```

[124]:

	State and UT	Area
30	Uttar Pradesh	4.336316e+08
16	Madhya Pradesh	3.298131e+08

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

```
DF.head(5)
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\1490598294.py:8: FutureWarning:

The `errwidth` parameter is deprecated. And will be removed in v0.15.0. Pass `err_kws={'linewidth': 0}` instead.

  sns.barplot(x=DF['State and UT'].head(5),
```

[124]:

	State and UT	Area
30	Uttar Pradesh	4.336316e+08
16	Madhya Pradesh	3.298131e+08
17	Maharashtra	3.222062e+08
25	Rajasthan	2.720249e+08
32	West Bengal	2.154052e+08

90°F Haze | Search | ENG IN | 17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

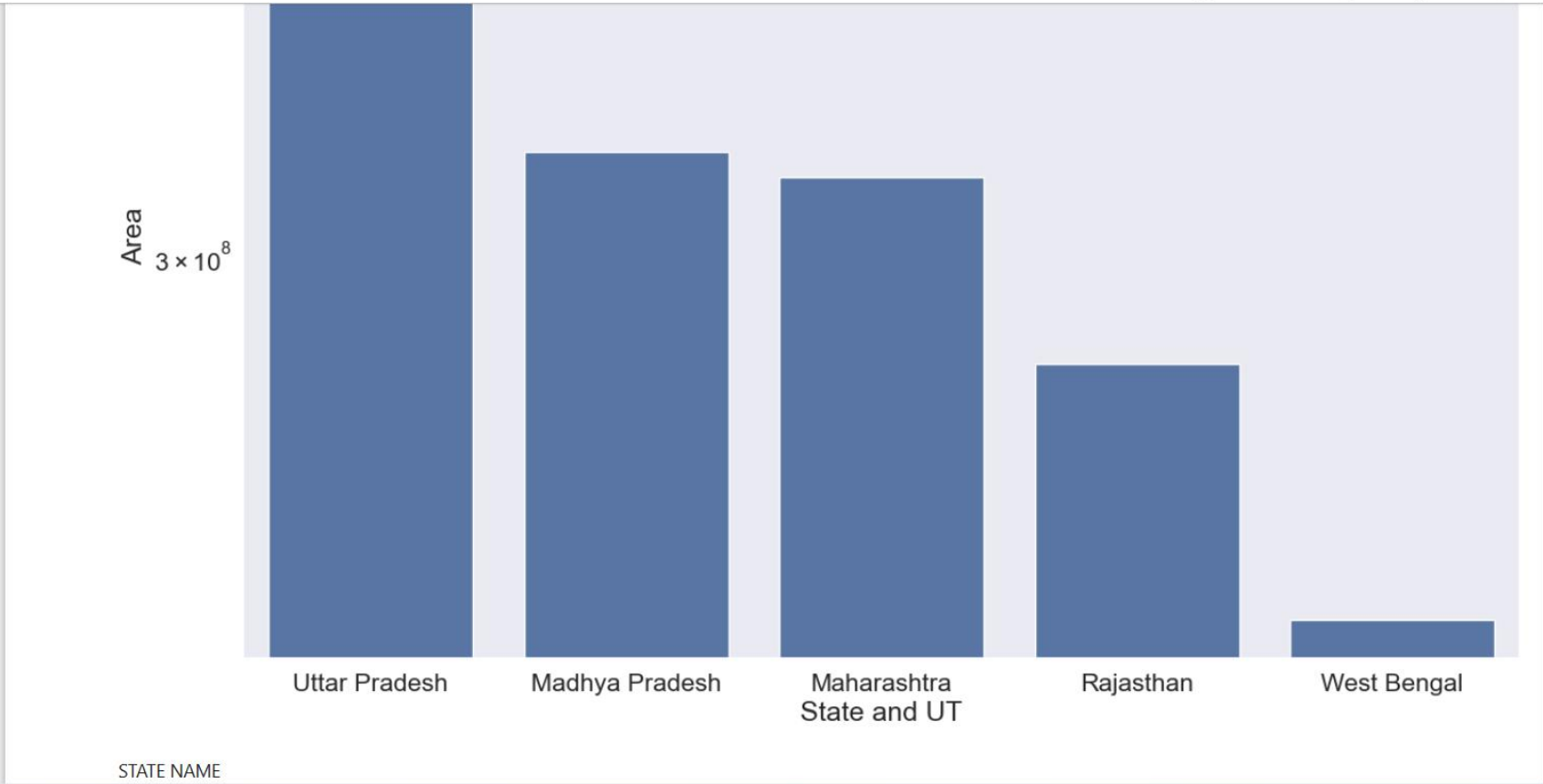
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

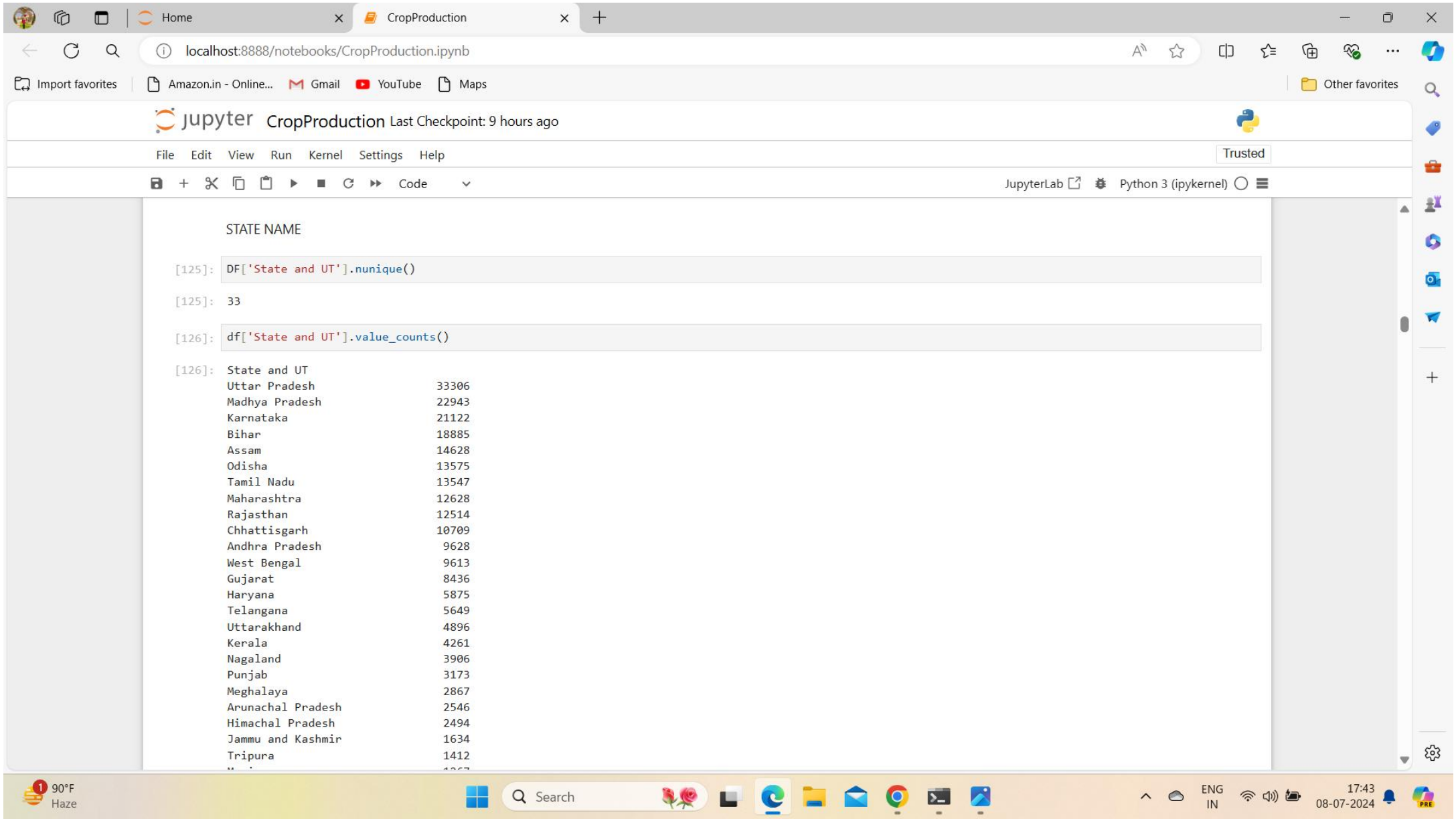
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:43 08-07-2024


Home
CropProduction
localhost:8888/notebooks/CropProduction.ipynb
Import favorites
Amazon.in - Online...
Gmail
YouTube
Maps
Other favorites
jupyter CropProduction Last Checkpoint: 9 hours ago
Trusted
File Edit View Run Kernel Settings Help
Code
JupyterLab
Python 3 (ipykernel)
STATE NAME
[125]: DF['State and UT'].nunique()
[125]: 33
[126]: df['State and UT'].value_counts()
[126]: State and UT
Uttar Pradesh 33306
Madhya Pradesh 22943
Karnataka 21122
Bihar 18885
Assam 14628
Odisha 13575
Tamil Nadu 13547
Maharashtra 12628
Rajasthan 12514
Chhattisgarh 10709
Andhra Pradesh 9628
West Bengal 9613
Gujarat 8436
Haryana 5875
Telangana 5649
Uttarakhand 4896
Kerala 4261
Nagaland 3906
Punjab 3173
Meghalaya 2867
Arunachal Pradesh 2546
Himachal Pradesh 2494
Jammu and Kashmir 1634
Tripura 1412
90°F Haze
Search
ENG IN
17:43 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

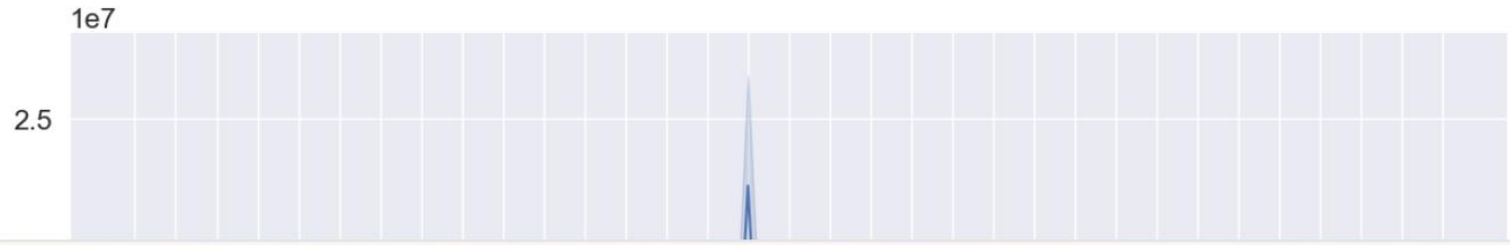
File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

```
Nagaland                          3906
Punjab                            3173
Meghalaya                         2867
Arunachal Pradesh                 2546
Himachal Pradesh                  2494
Jammu and Kashmir                 1634
Tripura                           1412
Manipur                           1267
Jharkhand                         1266
Mizoram                            957
Puducherry                         876
Sikkim                             714
Dadra and Nagar Haveli             263
Goa                                208
Andaman and Nicobar Islands        203
Chandigarh                          90
Name: count, dtype: int64
```

STATE AND UNION TERRITORY VS PRODUCTION IN TONES

[127]:
```
fig, ax = plt.subplots(figsize=(15,10))
sns.lineplot(x=df['State and UT'],y=df['Production'])
plt.xticks(rotation=90)
plt.show()
```



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

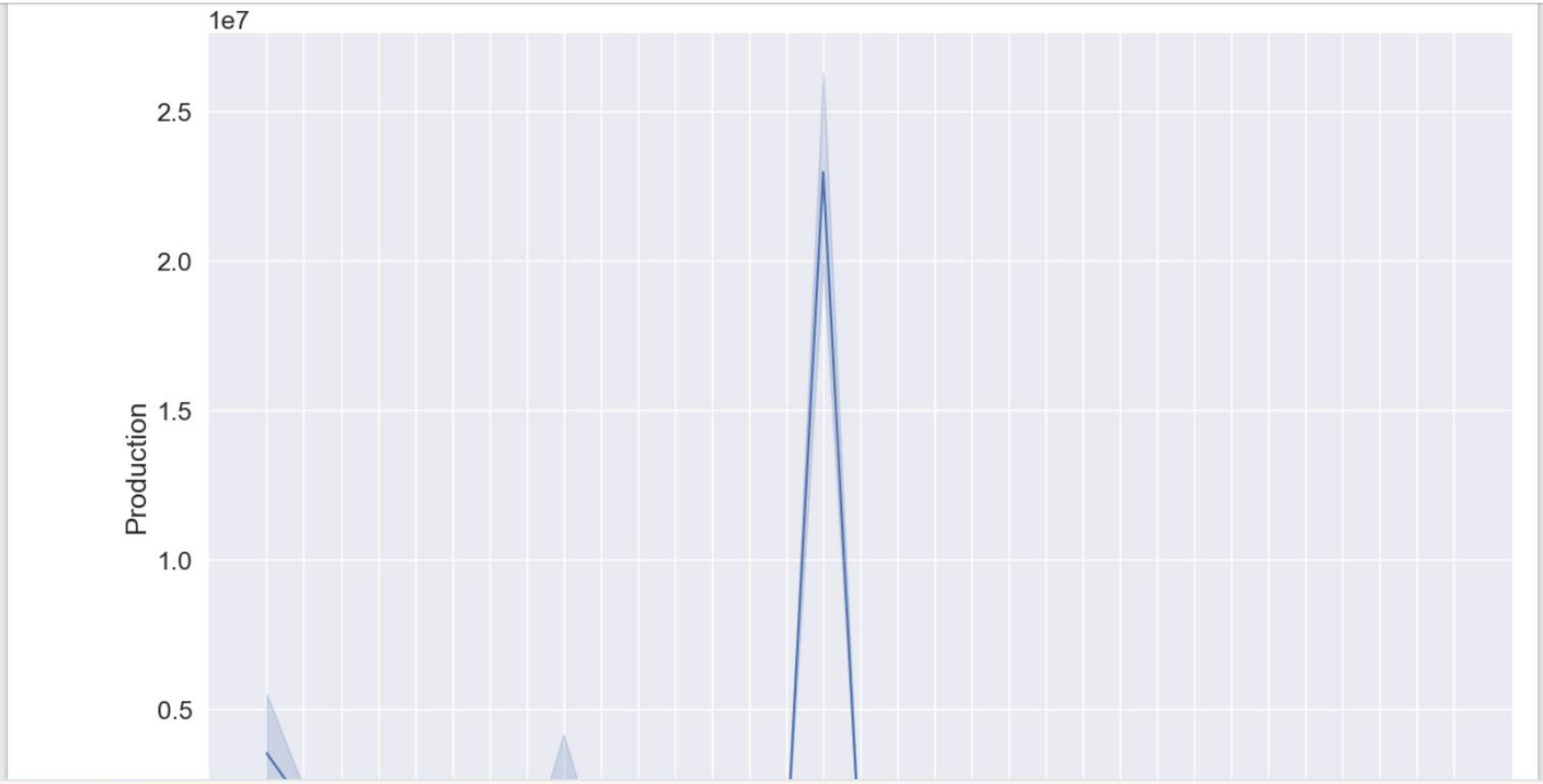
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

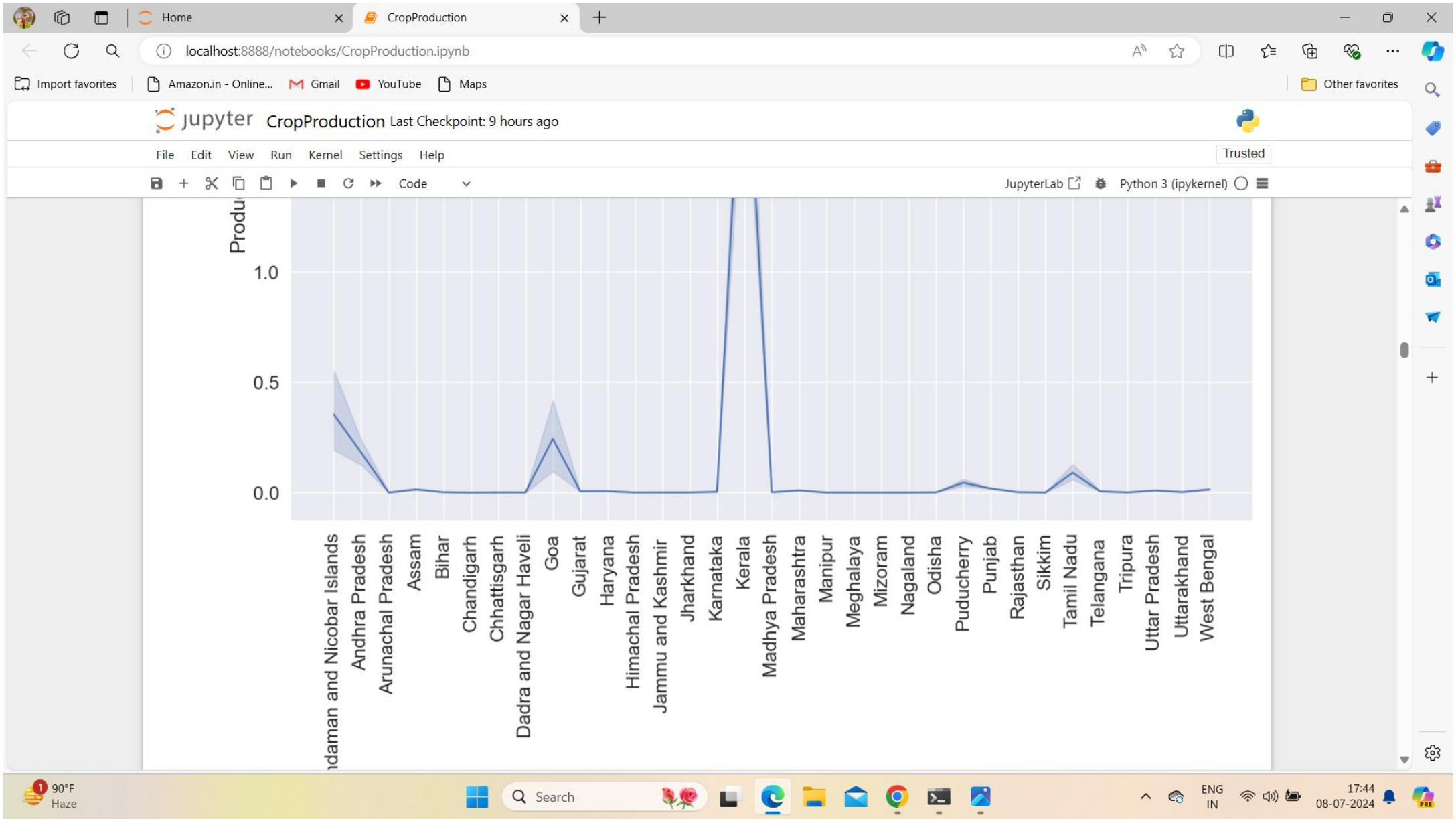
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:44 08-07-2024


Home
CropProduction
localhost:8888/notebooks/CropProduction.ipynb
Import favorites
Amazon.in - Online...
Gmail
YouTube
Maps
Other favorites
jupyter
CropProduction Last Checkpoint: 9 hours ago
File Edit View Run Kernel Settings Help
Trusted
Code
JupyterLab
Python 3 (ipykernel)
Produ
1.0
0.5
0.0
ndaman and Nicobar Islands
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chandigarh
Chhattisgarh
Dadra and Nagar Haveli
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Puducherry
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
90°F
Haze
Search
ENG
IN
17:44
08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

File Edit View Run Kernel Settings Help

Trusted

Code

JupyterLab | Python 3 (ipykernel)

DISTRICT

[128]:
```
df['District_Name'].nunique()
```

[128]: 646

TOP 10 DISTRICTS WITH HIGHEST PRODUCTION IN LAST 22 YEARS

[129]:
```
df.groupby(['State and UT',
            'District_Name']).sum().nlargest(10, 'Production')
```

[129]:

State and UT	District_Name	Crop_Year	Season	Crop	Area	Production
Kerala	KOZHIKODE	557628	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	2999653.25	1.528074e+10
	MALAPPURAM	613760	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	3210396.71	1.451840e+10
	THIRUVANANTHAPURAM	559601	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	2218004.26	1.002271e+10
	THRISSUR	563622	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	2447885.02	9.923508e+09
	KANNUR	601769	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	3011744.84	9.783432e+09
Andhra Pradesh	EAST GODAVARI	1534585	Kharif Kharif Kharif Kharif Kh...	Arhar/TurBajraCotton(lint)Dry chilliesGroundnu...	11598837.00	8.271057e+09
Kerala	KASARAGOD		Whole Year Whole Year Whole Year Whole	ArecanutBlack pepperCashewnutCoconut		

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

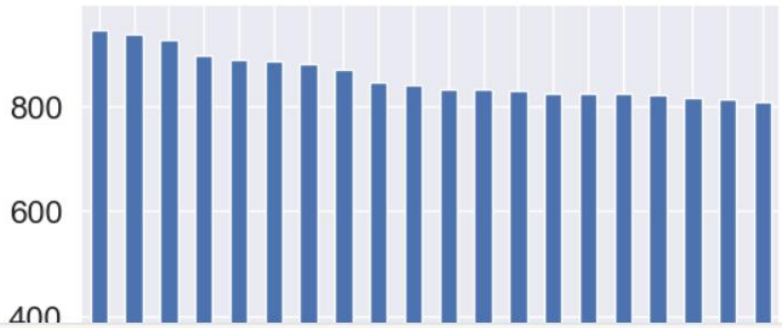
Code | JupyterLab | Python 3 (ipykernel)

Andhra Pradesh	**EAST GODAVARI**	1534585	Kharif Kharif Kharif Kharif Kh...	Arhar/TurBajraCotton(lint)DrychilliesGroundnu...	11598837.00	8.271057e+09
Kerala	**KASARAGOD**	653948	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	1872024.10	7.732217e+09
	KOLLAM	593753	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	2167962.15	7.151945e+09
	PALAKKAD	786382	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	3686323.76	6.369382e+09
	ERNAKULAM	573666	Whole Year Whole Year Whole Year Whole Year Wh...	ArecanutBlack pepperCashewnutCoconut TapiocaRi...	1928819.81	5.021649e+09

CROP

[130]:
```
df.District_Name.value_counts()[:20].plot(kind="bar")
```

[130]:
```
<Axes: xlabel='District_Name'>
```



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

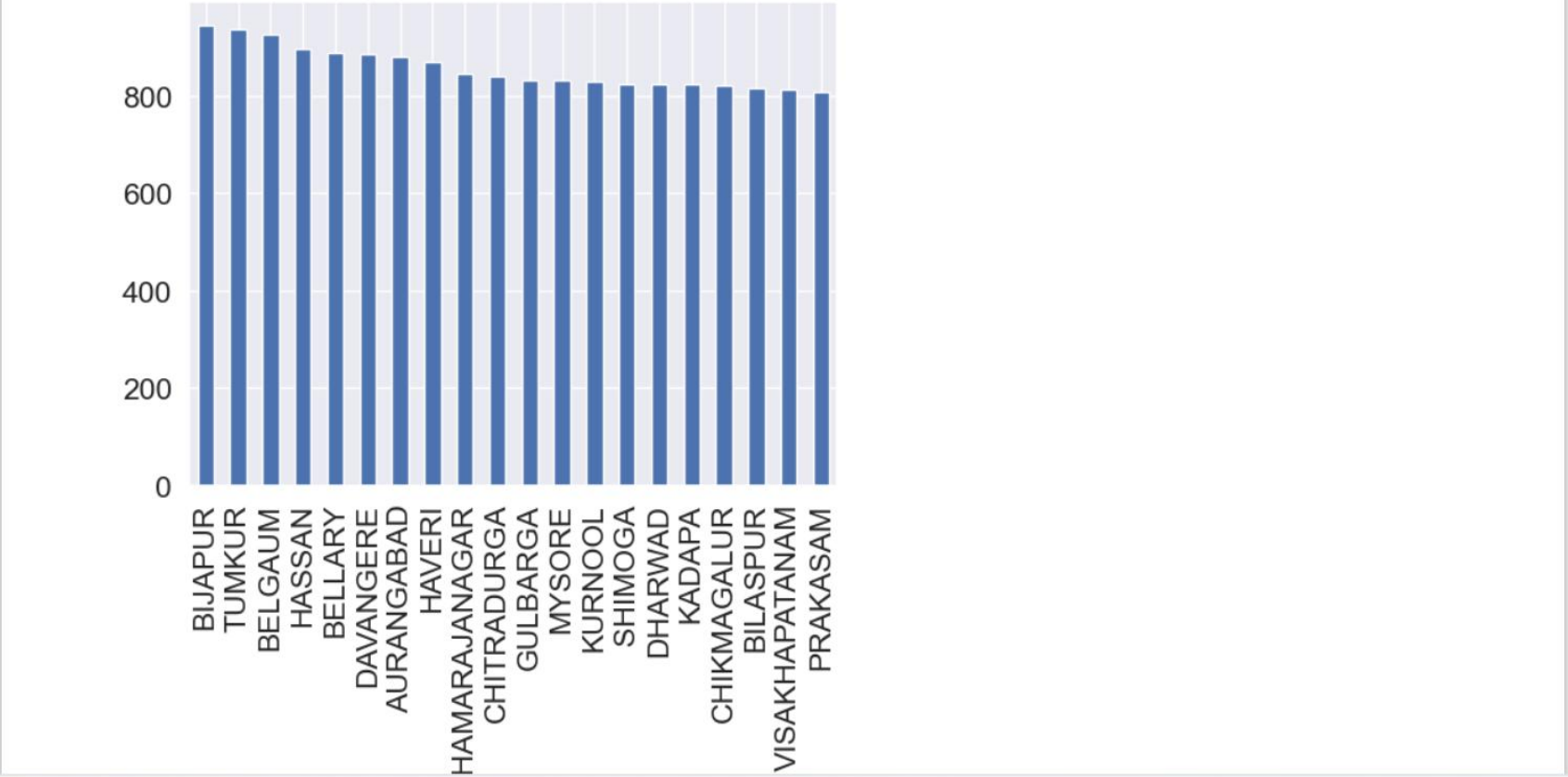
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

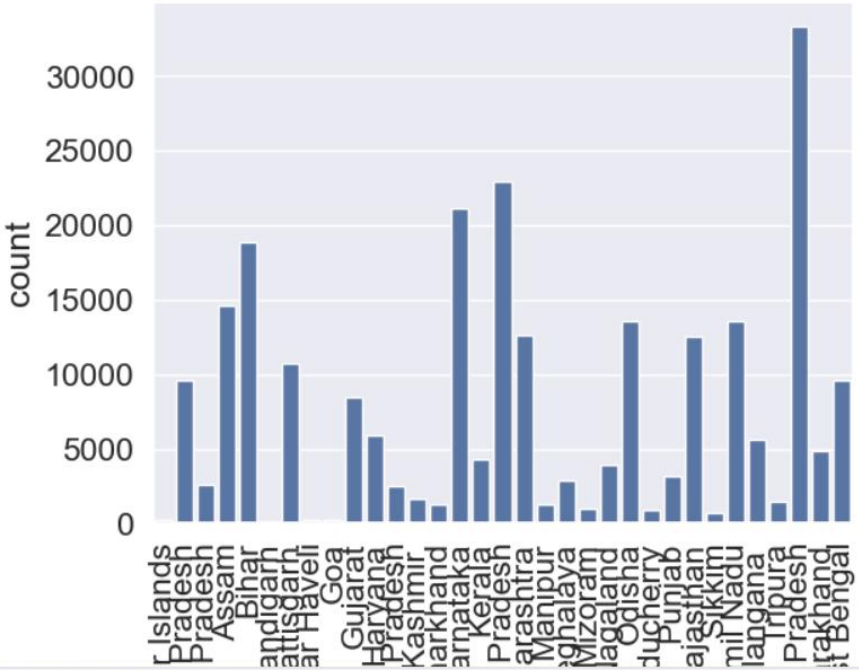
File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

District_Name

[148]:
```
sns.countplot(data = df, x = "State_Name")

plt.xticks(rotation = 90)
plt.show()
```



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[107]:
```
df.Crop_Year.value_counts()[:10]
```

[107]:
```
Crop_Year
2003    17287
2002    16671
2008    14550
2007    14526
2006    14328
2004    14117
2009    14116
2011    14071
2010    14065
2005    13799
Name: count, dtype: int64
```

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

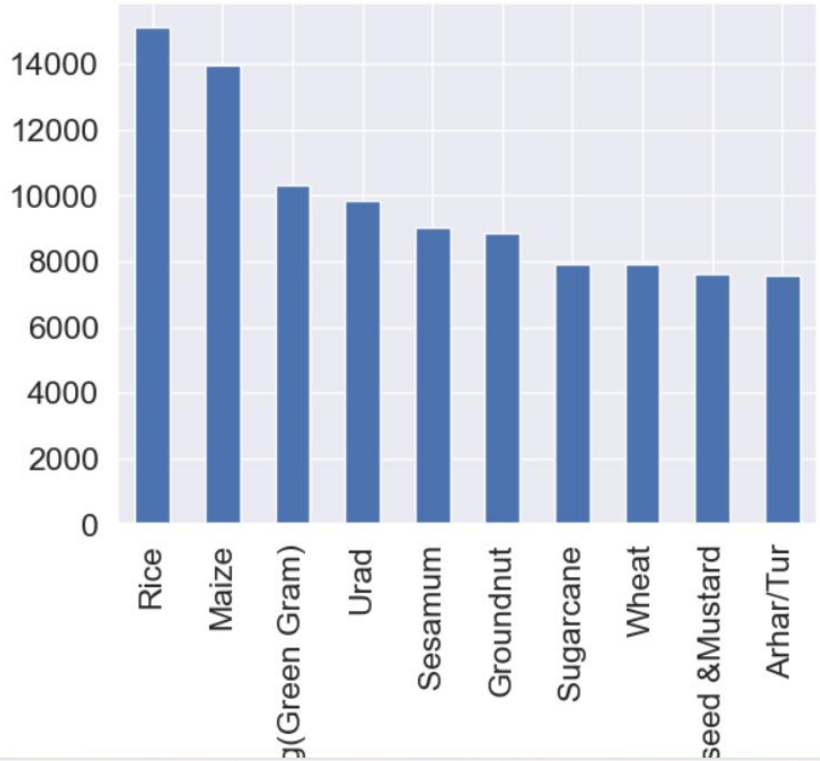
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[131]:
```
df.Crop.value_counts()[:10].plot(kind="bar")
```

[131]: <Axes: xlabel='Crop'>



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

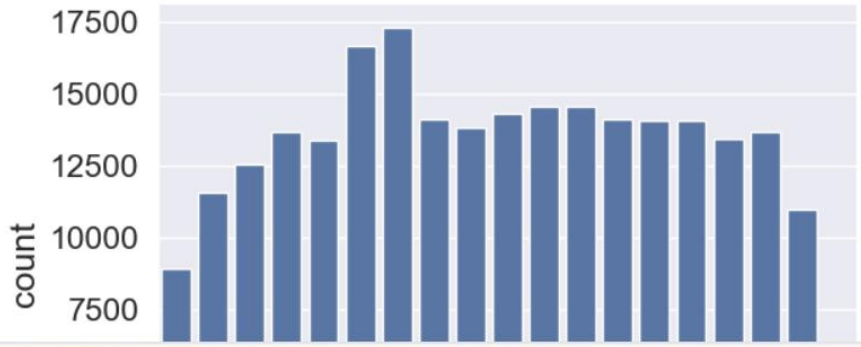
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[132]:
```
sns.countplot(data = df, x = "Crop_Year")

plt.xticks(rotation = 90)
plt.show()
```



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

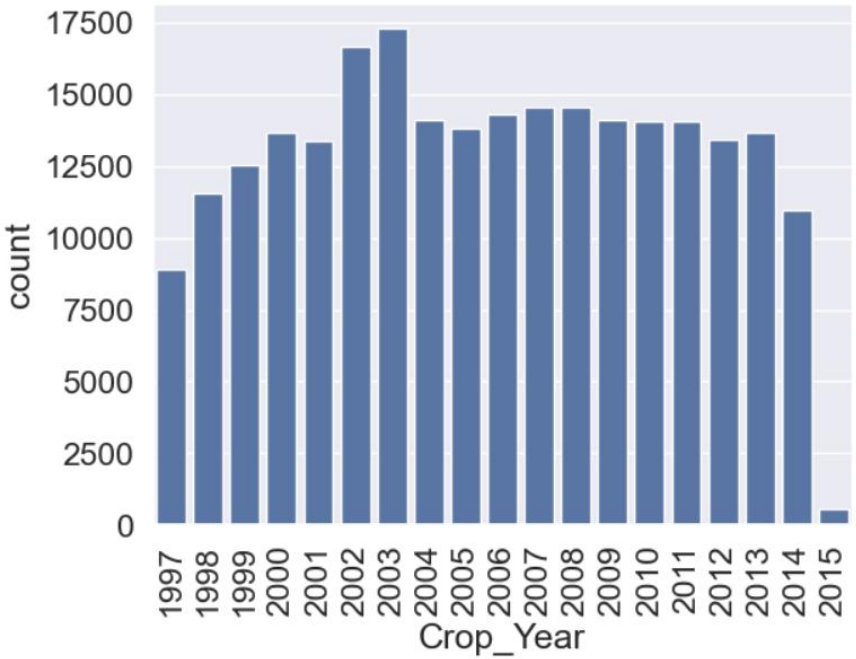
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[132]:
```
sns.countplot(data = df, x = "Crop_Year")

plt.xticks(rotation = 90)
plt.show()
```



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

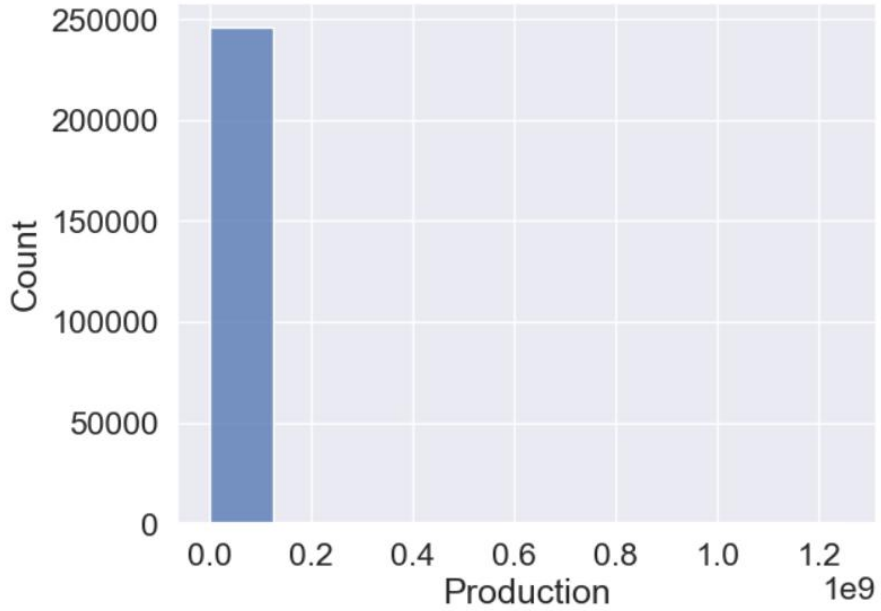
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[133]:
```
sns.histplot(data = df, x = "Production", bins = 10)
plt.show()
```



[134]:
```
sns.histplot(data = df, x = "Area", bins = 10)
plt.show()
```

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

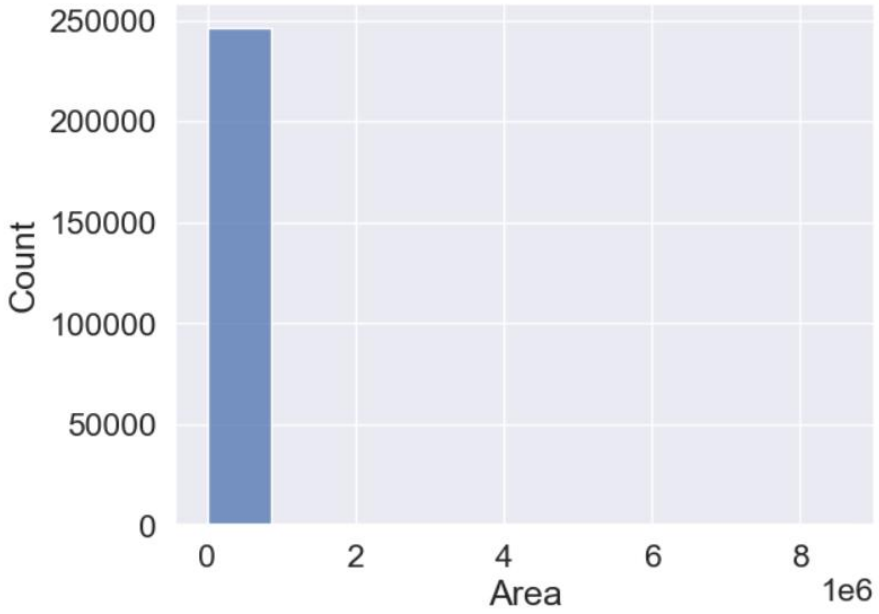
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[134]:
```
sns.histplot(data = df, x = "Area", bins = 10)
plt.show()
```



[135]:
```
sns.boxplot(data = df, x = "Production")
```

[135]:
```
<Axes: xlabel='Production'>
```

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

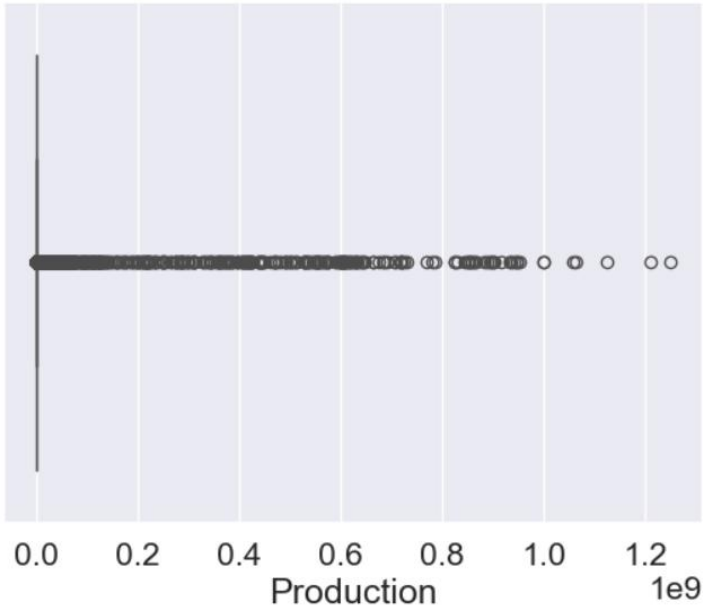
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[135]:
```
sns.boxplot(data = df, x = "Production")
```

[135]:
```
<Axes: xlabel='Production'>
```



[136]:
```
sns.boxplot(data = df, x = "Area")
```

[136]:
```
<Axes: xlabel='Area'>
```

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

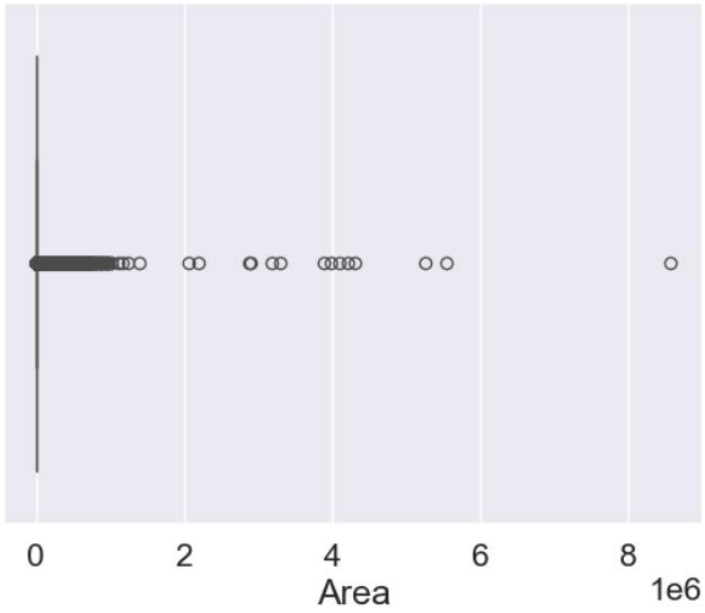
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[136]:
```
sns.boxplot(data = df, x = "Area")
```

[136]:
```
<Axes: xlabel='Area'>
```



[139]:
```
# Surprising that Kerala state has highest crop production.
df.groupby(["State_Name"]).agg({"Production" : "sum"}).plot(kind = "bar")
```

90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

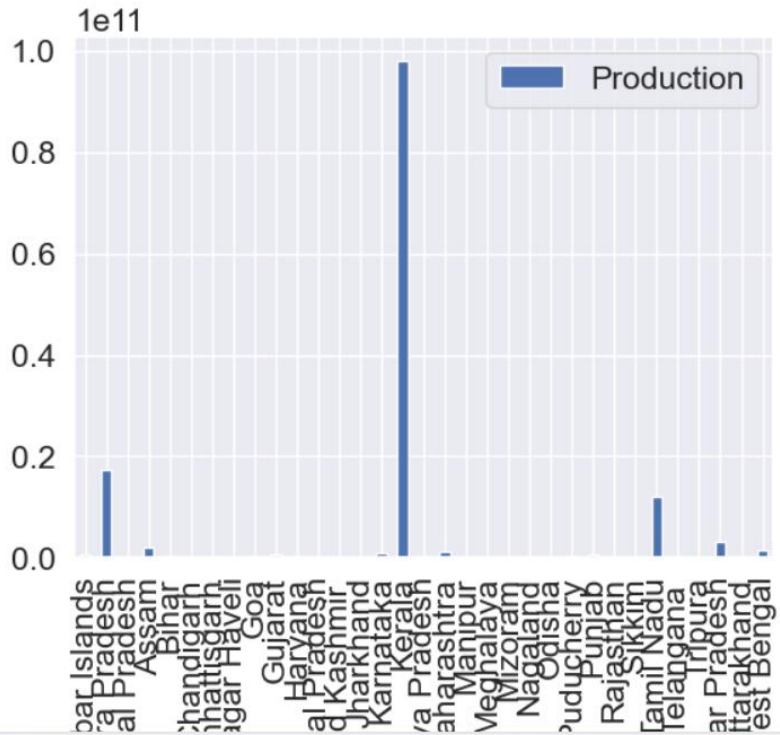
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[139]:
```
# Surprising that Kerala state has highest crop production.
df.groupby(["State_Name"]).agg({"Production" : "sum"}).plot(kind = "bar")
```

[139]: <Axes: xlabel='State_Name'>



90°F Haze | Search | ENG IN | 17:44 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[149]:
```
plt.figure(figsize=(20, 5))
df.groupby(["Crop_Year"]).agg({"Production":"sum"}).plot(kind="bar")
plt.show()
```

```
<Figure size 2000x500 with 0 Axes>
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

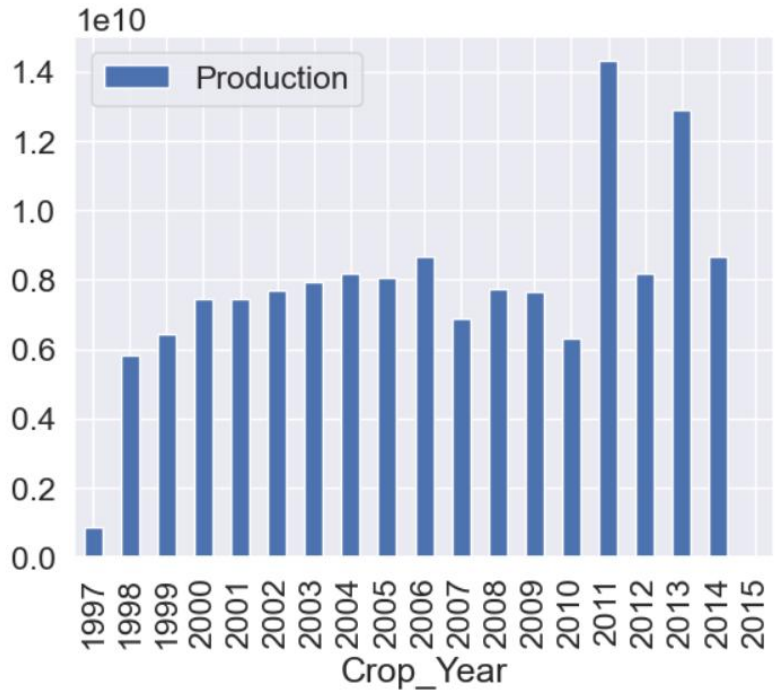
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[149]:
```
plt.figure(figsize=(20, 5))
df.groupby(["Crop_Year"]).agg({"Production":"sum"}).plot(kind="bar")
plt.show()
```

```
<Figure size 2000x500 with 0 Axes>
```



[150]:
```
df.groupby(["Season"]).agg({"Production":"sum"}).plot(kind="bar")
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

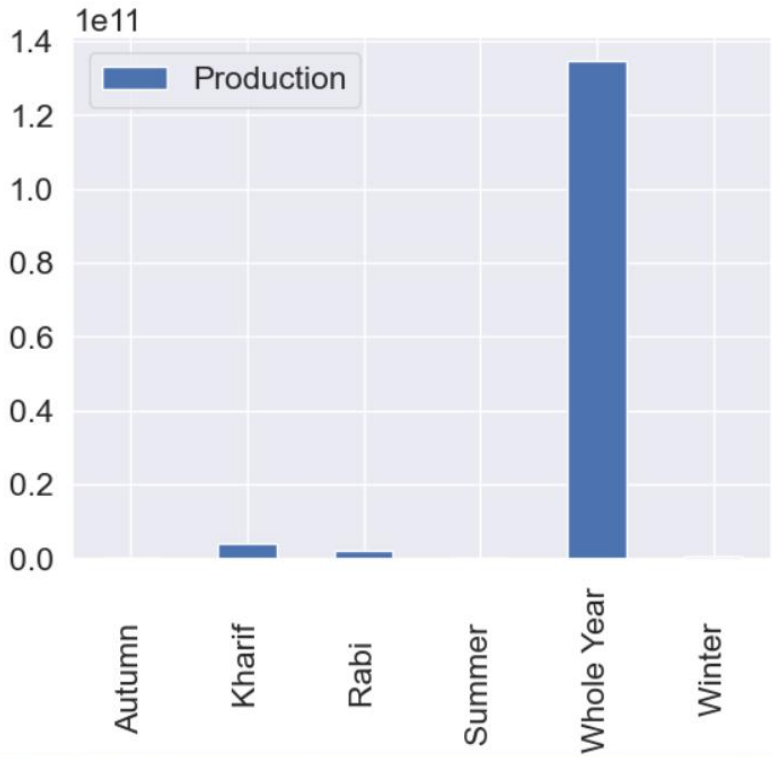
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

```
[150]: df.groupby(["Season"]).agg({"Production":"sum"}).plot(kind="bar")
```

```
[150]: <Axes: xlabel='Season'>
```



90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

Season

PRODUCTION OF THE MAJOR CROPS RICE AND WHEAT IN LAST 22 YEARS

[151]:
```
df.groupby('Crop')['Production'].sum().reset_index().sort_values(
    by='Production', ascending=False)
```

[151]:

	Crop	Production
28	Coconut	1.299816e+11
106	Sugarcane	5.535682e+09
95	Rice	1.605470e+09
119	Wheat	1.332826e+09
87	Potato	4.248263e+08
...	...	...
71	Other Citrus Fruit	0.000000e+00
35	Cucumber	0.000000e+00
58	Litchi	0.000000e+00
54	Lab-Lab	0.000000e+00
0	Apple	0.000000e+00

124 rows × 2 columns

[153]:
```
DF = df.copy()
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[153]:
```
DF = df.copy()
DF = DF.groupby(
    by='Crop_Year')['Production'].sum().reset_index().sort_values(
        by='Production', ascending=False)

fig, ax = plt.subplots(figsize=(10, 8))
sns.barplot(x=DF['Crop_Year'], y=DF['Production'], errwidth=2)
sns.set(font_scale=1)
plt.yscale('log')
DF
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\3093028488.py:7: FutureWarning:

The `errwidth` parameter is deprecated. And will be removed in v0.15.0. Pass `err_kws={'linewidth': 2}` instead.

  sns.barplot(x=DF['Crop_Year'], y=DF['Production'], errwidth=2)
```

[153]:

	Crop_Year	Production
14	2011	1.430890e+10
16	2013	1.290359e+10
9	2006	8.681913e+09
17	2014	8.664541e+09
7	2004	8.189462e+09
15	2012	8.171055e+09
8	2005	8.043757e+09
6	2003	7.917974e+09
11	2008	7.717018e+09

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

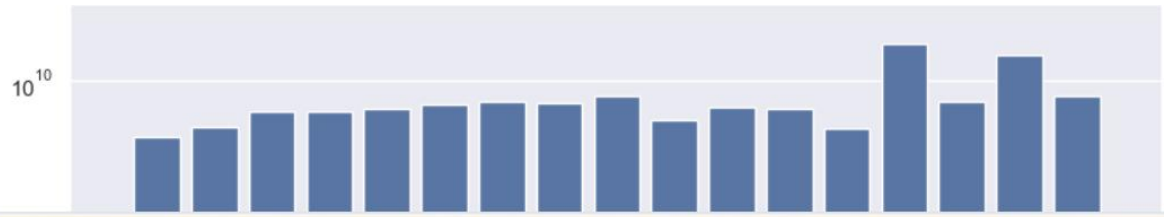
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

15	2012	8.171055e+09
8	2005	8.043757e+09
6	2003	7.917974e+09
11	2008	7.717018e+09
5	2002	7.696955e+09
12	2009	7.660494e+09
4	2001	7.465541e+09
3	2000	7.449709e+09
10	2007	6.879442e+09
2	1999	6.434666e+09
13	2010	6.307609e+09
1	1998	5.825321e+09
0	1997	8.512329e+08
18	2015	6.935065e+06



90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

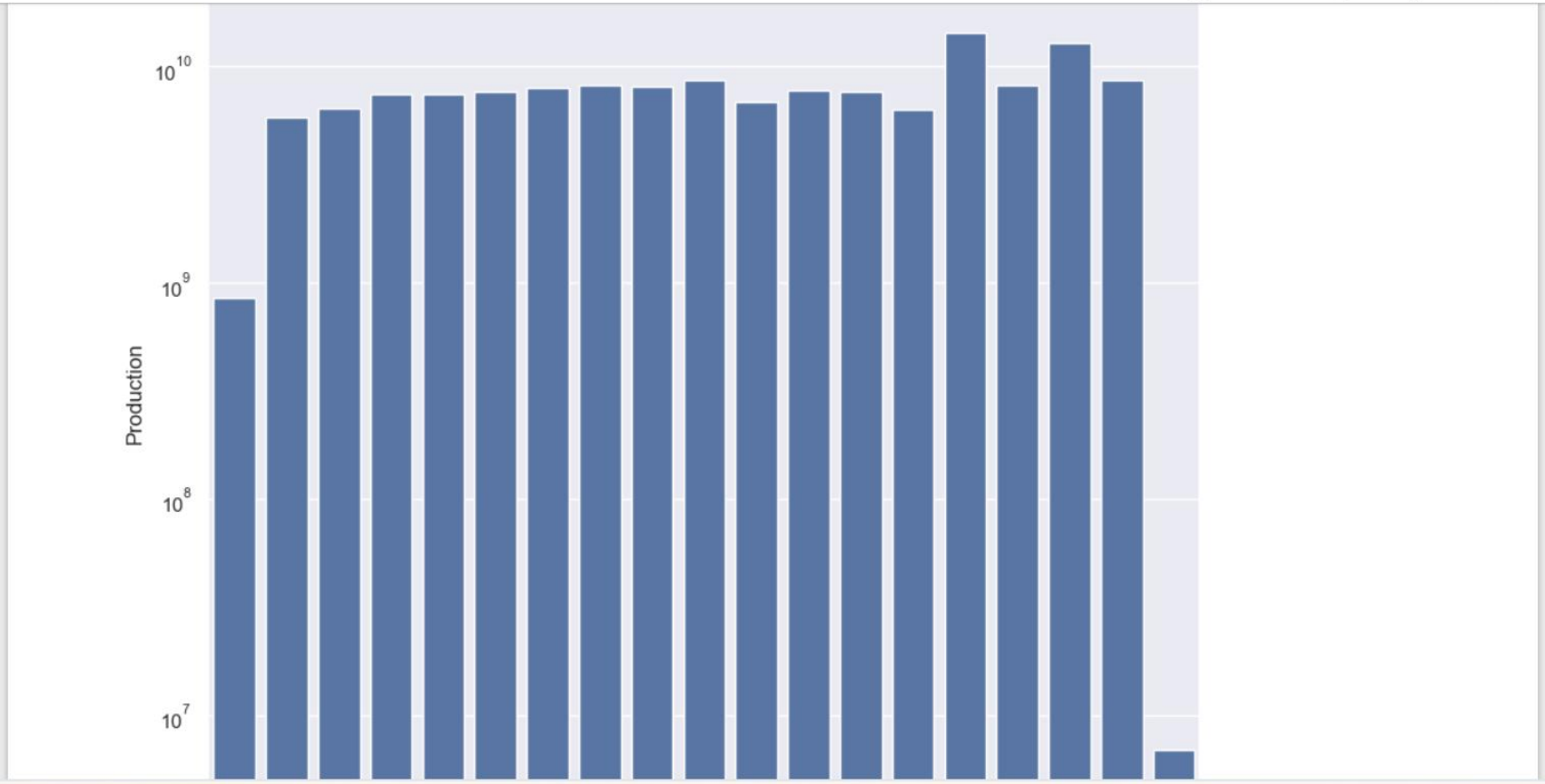
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

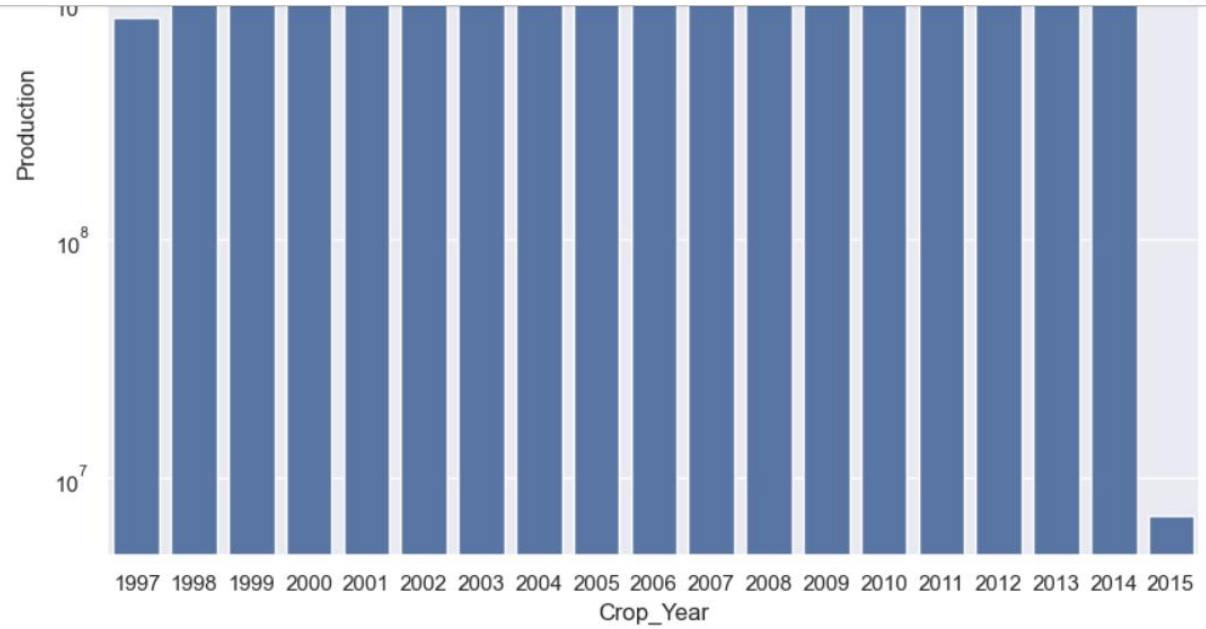
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:45 08-07-2024



PRODUCTION OF WHEAT

[155]:
```
rice = df[df['Crop'] == 'Wheat']
rice
```

[155]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
230	Andhra Pradesh	ANANTAPUR	1997	Rabi	Wheat	300.0	200.0

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[155]:
```
rice = df[df['Crop'] == 'Wheat']
rice
```

[155]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
230	Andhra Pradesh	ANANTAPUR	1997	Rabi	Wheat	300.0	200.0
255	Andhra Pradesh	ANANTAPUR	1998	Rabi	Wheat	400.0	200.0
284	Andhra Pradesh	ANANTAPUR	1999	Rabi	Wheat	439.0	294.0
326	Andhra Pradesh	ANANTAPUR	2000	Rabi	Wheat	520.0	297.0
372	Andhra Pradesh	ANANTAPUR	2001	Rabi	Wheat	307.0	213.0
...	...	...	...	...	...	...	...
245949	West Bengal	PURULIA	2010	Rabi	Wheat	2013.0	5152.0
245980	West Bengal	PURULIA	2011	Rabi	Wheat	1880.0	4206.0
246012	West Bengal	PURULIA	2012	Rabi	Wheat	1648.0	3310.0
246047	West Bengal	PURULIA	2013	Rabi	Wheat	1187.0	2675.0
246084	West Bengal	PURULIA	2014	Rabi	Wheat	1622.0	3663.0

7899 rows × 7 columns

STATE AND UT VS PRODUCTION OF RICE

[156]:
```
sns.barplot(x='State_Name', y='Production', data=rice)
plt.xticks(rotation=90)
plt.show()
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

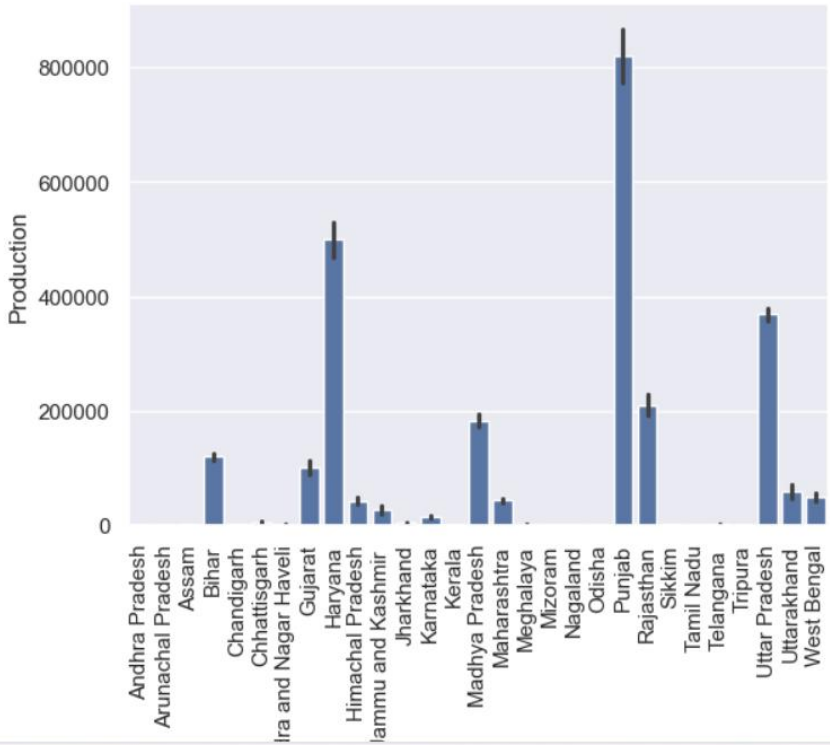
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[156]:
```
sns.barplot(x='State_Name', y='Production', data=rice)
plt.xticks(rotation=90)
plt.show()
```



90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

State_Name

TOP 5 DISTRICTS WITH HIGHEST YIELD OF RICE

[157]:
```
DF = rice.copy()
DF = DF.groupby(
    by='District_Name')['Production'].sum().reset_index().sort_values(
        by='Production', ascending=False)

fig, ax = plt.subplots(figsize=(10, 8))
sns.barplot(x=DF['District_Name'].head(),
            y=DF['Production'].head(),
            errwidth=2)
sns.set(font_scale=1)
plt.yscale('log')
DF.head()
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\4089779059.py:7: FutureWarning:

The `errwidth` parameter is deprecated. And will be removed in v0.15.0. Pass `err_kws={'linewidth': 2}` instead.

  sns.barplot(x=DF['District_Name'].head(),
```

[157]:

	District_Name	Production
174	FIROZEPUR	28037000.0
454	SANGRUR	27948000.0
320	LUDHIANA	22779000.0
399	PATIALA	21325000.0
20	AMRITSAR	20989000.0

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

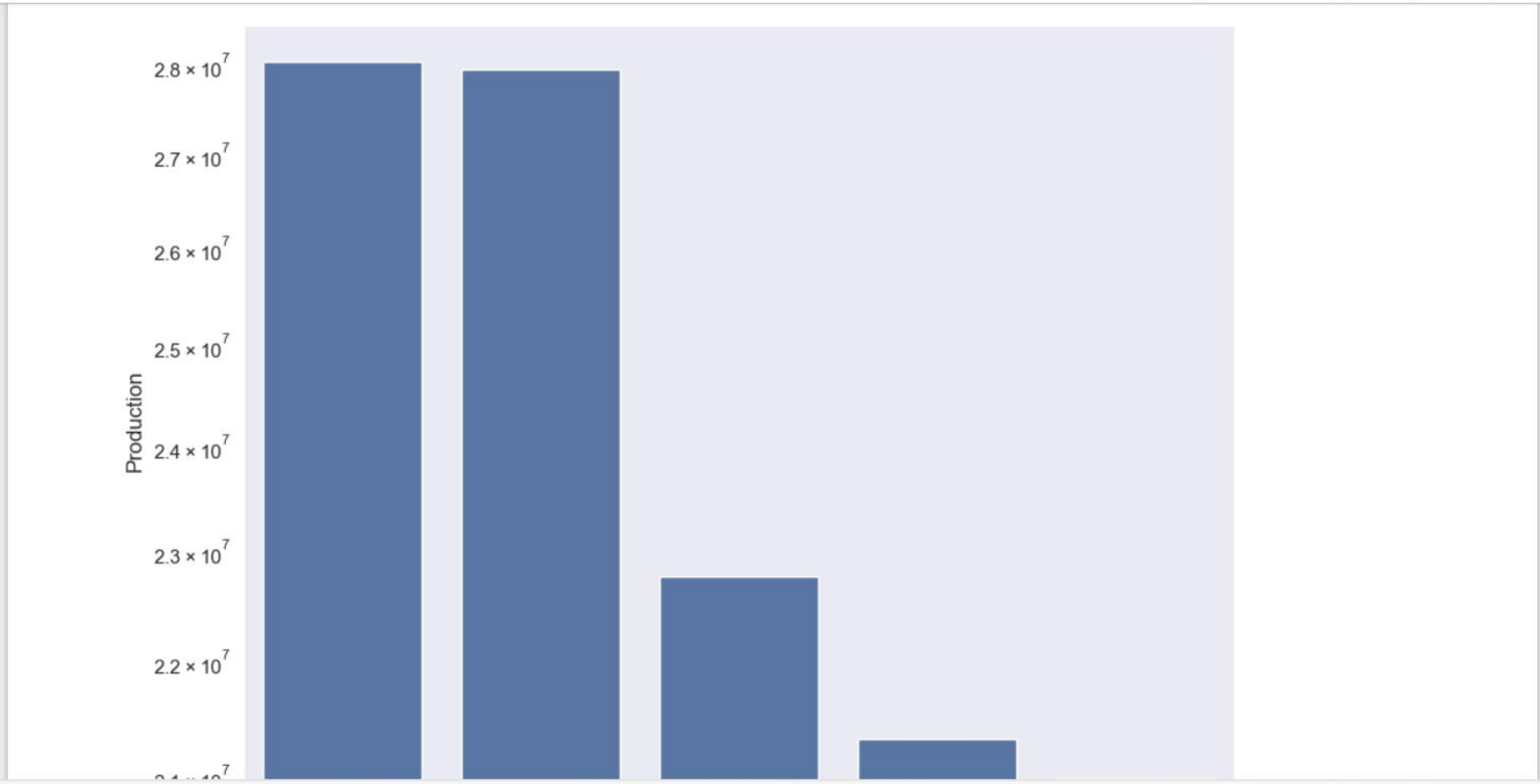
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

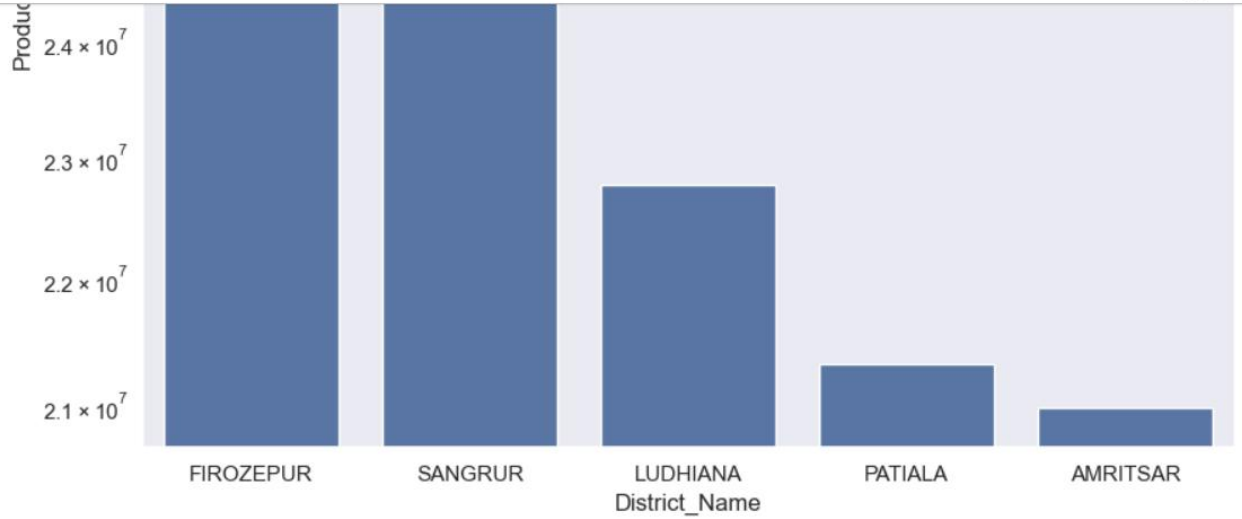
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



YEAR WISE PRODUCTION OF RICE

[159]:
```
plt.figure(figsize=(15, 5))
sns.barplot(x='Crop_Year', y='Production', data=rice)
plt.xticks(rotation=45)
plt.show()
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

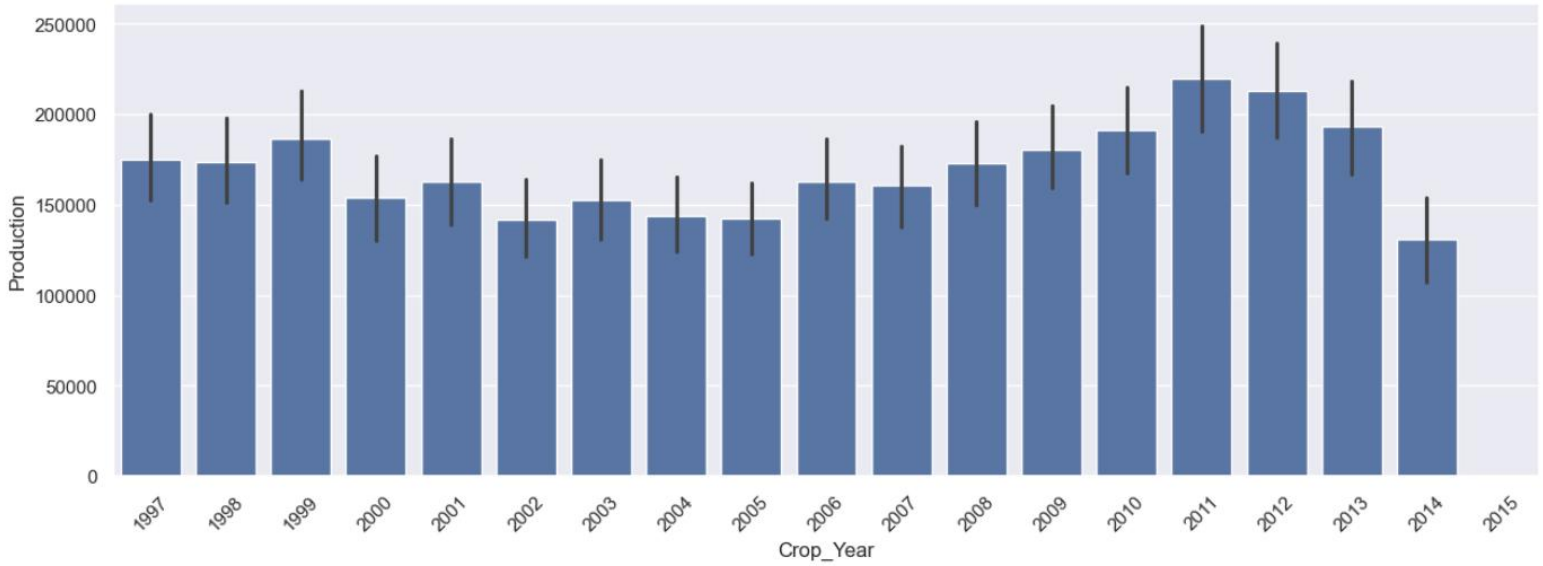
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[159]:
```
plt.figure(figsize=(15, 5))
sns.barplot(x='Crop_Year', y='Production', data=rice)
plt.xticks(rotation=45)
plt.show()
```



AREA WISE PRODUCTION OF RICE

[160]:
```
sns.jointplot(x='Area',
              y='Production',
```

90°F Haze | Search | ENG IN | 17:45 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

File Edit View Run Kernel Settings Help

Trusted

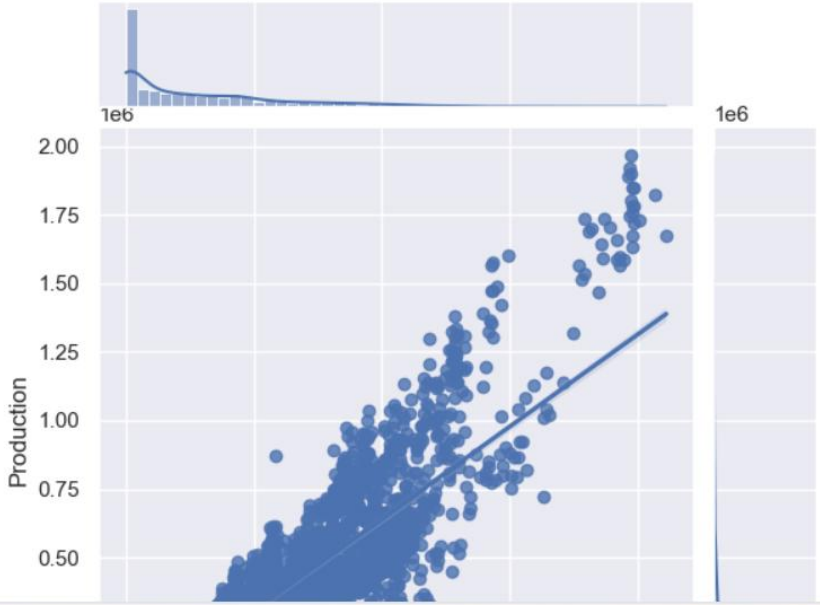
Code

JupyterLab | Python 3 (ipykernel)

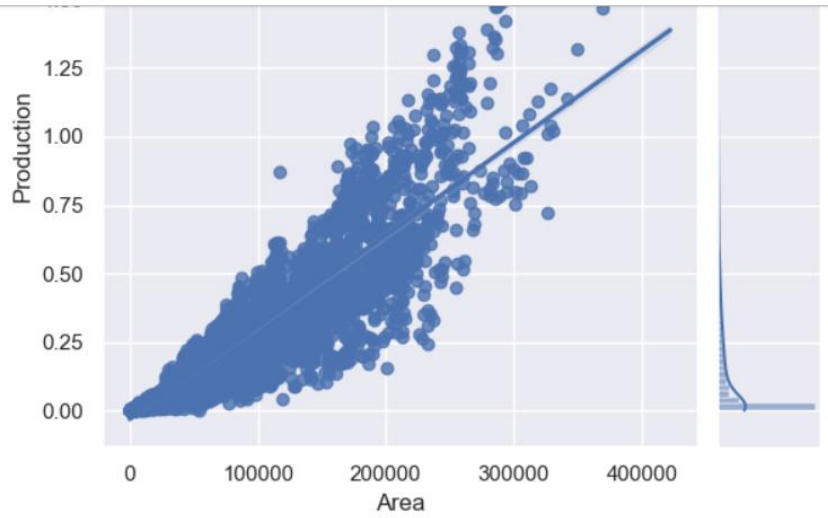
AREA WISE PRODUCTION OF RICE

[160]:
```
sns.jointplot(x='Area',
              y='Production',
              data=rice,
              kind='reg')
```

[160]: <seaborn.axisgrid.JointGrid at 0x1b6998a0980>



90°F Haze | Search | ENG IN | 17:45 08-07-2024



Insights:- From Data Visualization

*Rice production is mostly dependent on Area and State/Union Territory/District.

*Rice is not seasonal according the graphs.

[161]:
```
wheat = df[df['Crop'] == 'Wheat']
wheat.head()
```

[161]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[161]:
```
wheat = df[df['Crop'] == 'Wheat']
wheat.head()
```

[161]:

	State_Name	District_Name	Crop_Year	Season	Crop	Area	Production
230	Andhra Pradesh	ANANTAPUR	1997	Rabi	Wheat	300.0	200.0
255	Andhra Pradesh	ANANTAPUR	1998	Rabi	Wheat	400.0	200.0
284	Andhra Pradesh	ANANTAPUR	1999	Rabi	Wheat	439.0	294.0
326	Andhra Pradesh	ANANTAPUR	2000	Rabi	Wheat	520.0	297.0
372	Andhra Pradesh	ANANTAPUR	2001	Rabi	Wheat	307.0	213.0

STATE AND UT VS PRODUCTION OF WHEAT

[162]:
```
plt.figure(figsize=(15, 5))
sns.barplot(x='State_Name', y='Production', data=wheat)
plt.xticks(rotation=90)
plt.show()
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

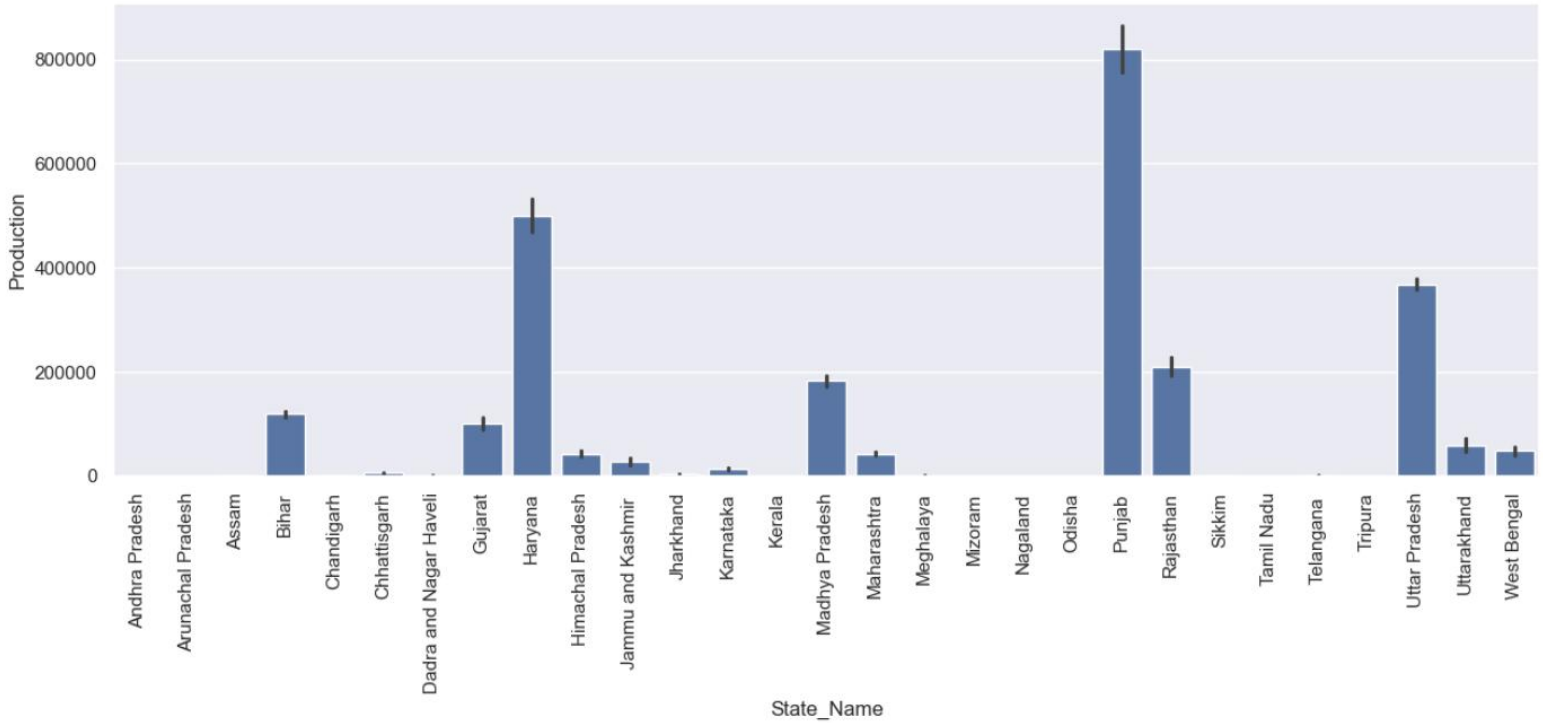
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



TOP 5 DISTRICT WITH HIGHEST YIELD OF WHEAT

[163]:
```
TopWheatPro = wheat.groupby(
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[163]:
```
TopWheatPro = wheat.groupby(
    'District_Name')['Production'].sum().reset_index().sort_values(
        by='Production', ascending=False)
summ = TopWheatPro['Production'].sum()
TopWheatPro['Production in %'] = TopWheatPro['Production'].map(
    lambda x: (x / summ) * 100)
TopWheatPro.head()
```

[163]:

	District_Name	Production	Production in %
174	FIROZEPUR	28037000.0	2.103576
454	SANGRUR	27948000.0	2.096898
320	LUDHIANA	22779000.0	1.709076
399	PATIALA	21325000.0	1.599984
20	AMRITSAR	20989000.0	1.574775

[165]:
```
DF1 = wheat.copy()
DF1 = DF1.groupby(
    by='District_Name')['Production'].sum().reset_index().sort_values(
        by='Production', ascending=False)

fig, ax = plt.subplots(figsize=(10, 8))
sns.barplot(x=DF1['District_Name'].head(),
            y=DF['Production'].head(),
            errwidth=2)
sns.set(font_scale=1)
plt.yscale('log')
DF1.head()
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

```
DF1.head()
```

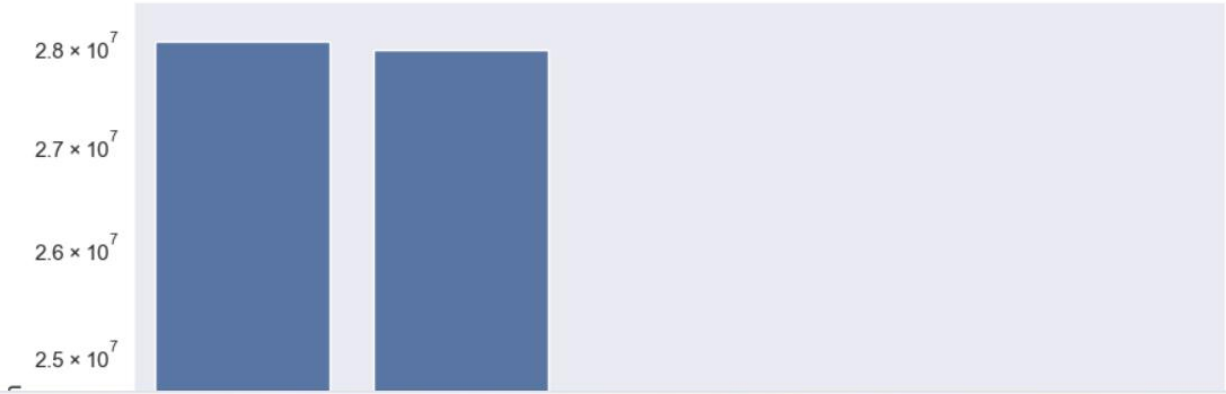
```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\3631515190.py:7: FutureWarning:

The `errwidth` parameter is deprecated. And will be removed in v0.15.0. Pass `err_kws={'linewidth': 2}` instead.

  sns.barplot(x=DF1['District_Name'].head(),
```

[165]:

	District_Name	Production
174	FIROZEPUR	28037000.0
454	SANGRUR	27948000.0
320	LUDHIANA	22779000.0
399	PATIALA	21325000.0
20	AMRITSAR	20989000.0



90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

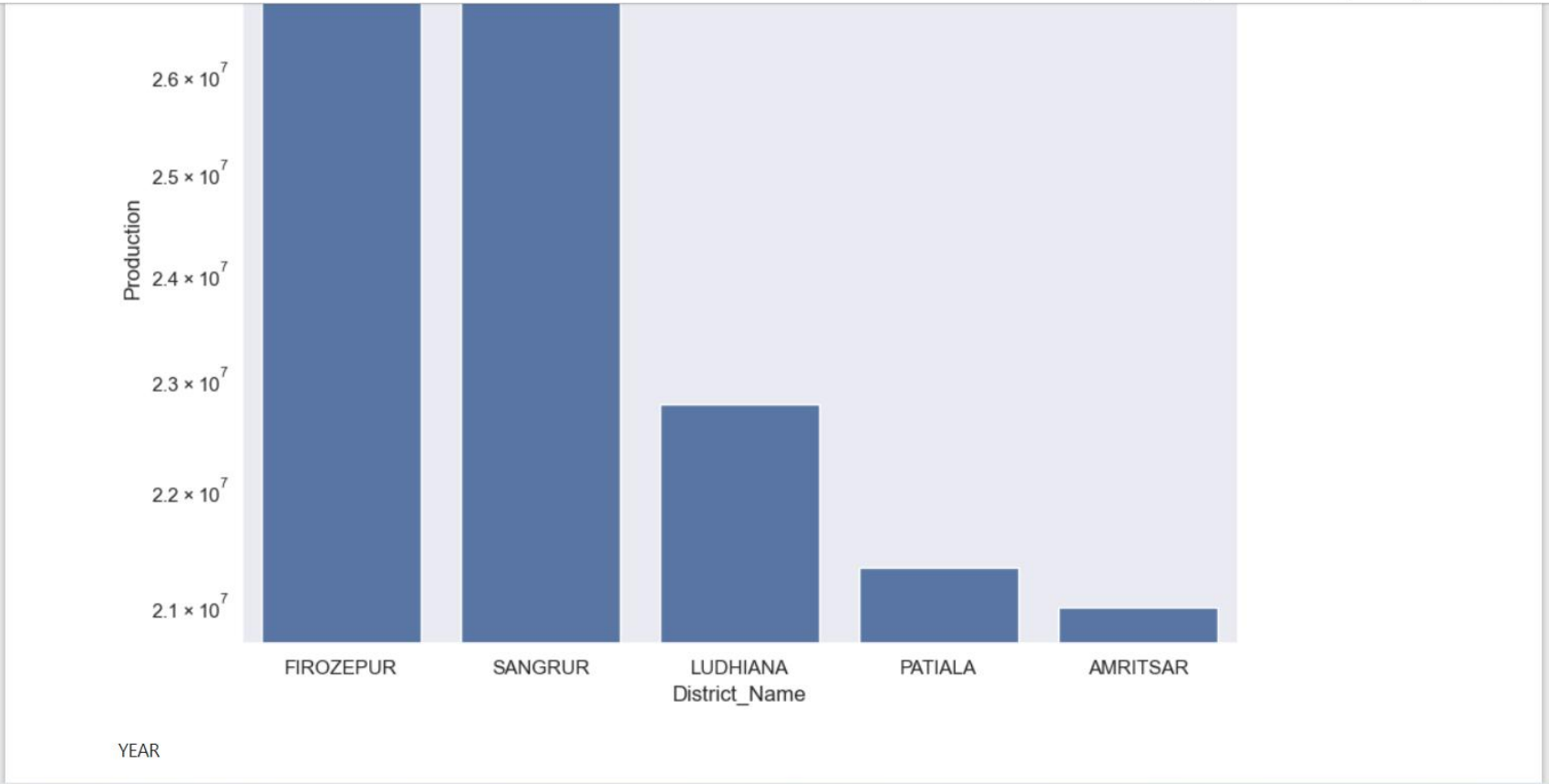
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

YEAR

[167]:
```
df['Crop_Year'].nunique()
```

[167]:
```
19
```

[168]:
```
df['Crop_Year'].value_counts()
```

[168]:
```
Crop_Year
2003    17287
2002    16671
2008    14550
2007    14526
2006    14328
2004    14117
2009    14116
2011    14071
2010    14065
2005    13799
2000    13658
2013    13650
2012    13410
2001    13361
1999    12515
1998    11533
2014    10973
1997     8899
2015      562
Name: count, dtype: int64
```

YEAR VS PRODUCTION

[169]:
```
sns.lineplot(x=df['Crop_Year'], y=df['Production'])
plt.show()
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

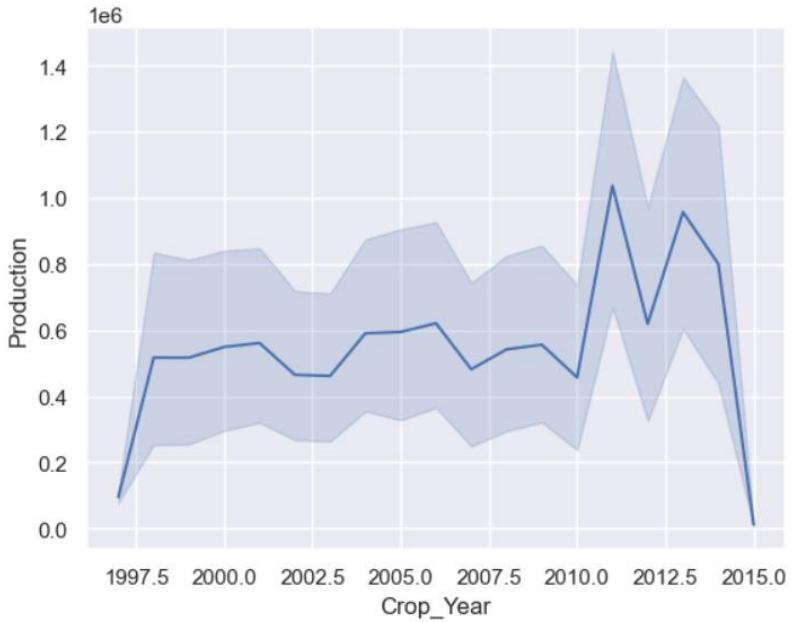
Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

YEAR VS PRODUCTION

[169]:
```
sns.lineplot(x=df['Crop_Year'], y=df['Production'])
plt.show()
```



SEASON

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

[170]:
```
df['Season'].value_counts()
```

[170]:
```
Season
Kharif         95951
Rabi           66987
Whole Year     57305
Summer         14841
Winter          6058
Autumn          4949
Name: count, dtype: int64
```

SEASON BASED PRODUCTION

[171]:
```
sns.barplot(x=df['Season'], y=df['Production'])
plt.show()
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

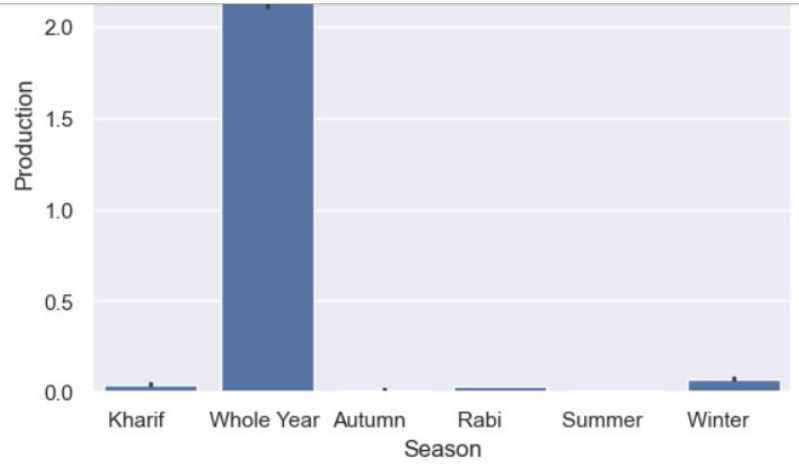
Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)



SEASON VS PRODUCTION OF RICE

[172]:
```
sns.barplot(x='Season', y='Production', data=rice, ci=100)
sns.set(font_scale=1)
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_6272\3927396913.py:1: FutureWarning:

The `ci` parameter is deprecated. Use `errorbar=('ci', 100)` for the same effect.

  sns.barplot(x='Season', y='Production', data=rice, ci=100)
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024

Home | CropProduction

localhost:8888/notebooks/CropProduction.ipynb

Import favorites | Amazon.in - Online... | Gmail | YouTube | Maps | Other favorites

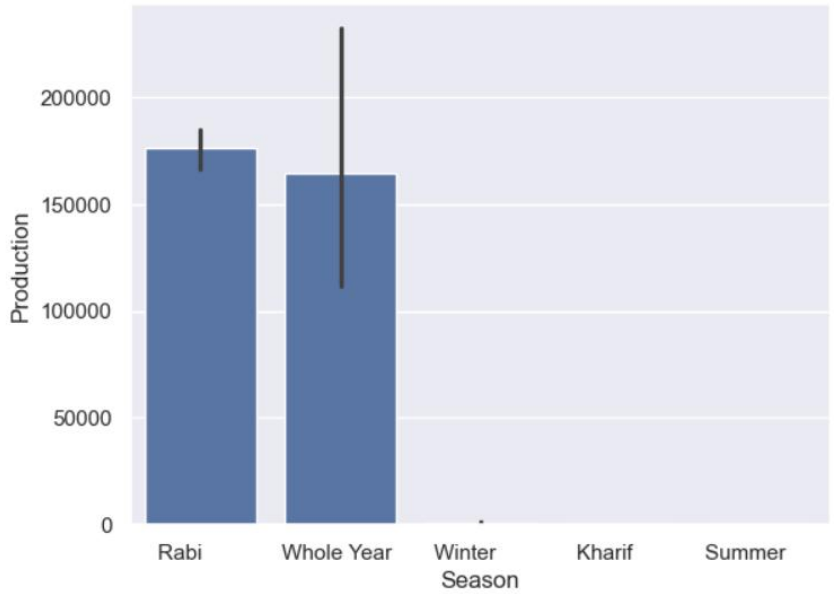
jupyter CropProduction Last Checkpoint: 9 hours ago

Trusted

File Edit View Run Kernel Settings Help

Code | JupyterLab | Python 3 (ipykernel)

```
sns.barplot(x='Season', y='Production', data=rice, ci=100)
```




```
[ ]:
```

90°F Haze | Search | ENG IN | 17:46 08-07-2024