ai-ml-assignment-2

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[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[ ]:
```
ak = sns.load_dataset('car_crashes')
ak
```

[ ]:

	total	speeding	alcohol	not_distracted	no_previous	ins_premium	\
0	18.8	7.332	5.640	18.048	15.040	784.55	
1	18.1	7.421	4.525	16.290	17.014	1053.48	
2	18.6	6.510	5.208	15.624	17.856	899.47	
3	22.4	4.032	5.824	21.056	21.280	827.34	
4	12.0	4.200	3.360	10.920	10.680	878.41	
5	13.6	5.032	3.808	10.744	12.920	835.50	
6	10.8	4.968	3.888	9.396	8.856	1068.73	
7	16.2	6.156	4.860	14.094	16.038	1137.87	
8	5.9	2.006	1.593	5.900	5.900	1273.89	
9	17.9	3.759	5.191	16.468	16.826	1160.13	
10	15.6	2.964	3.900	14.820	14.508	913.15	
11	17.5	9.450	7.175	14.350	15.225	861.18	
12	15.3	5.508	4.437	13.005	14.994	641.96	
13	12.8	4.608	4.352	12.032	12.288	803.11	
14	14.5	3.625	4.205	13.775	13.775	710.46	
15	15.7	2.669	3.925	15.229	13.659	649.06	
16	17.8	4.806	4.272	13.706	15.130	780.45	
17	21.4	4.066	4.922	16.692	16.264	872.51	
18	20.5	7.175	6.765	14.965	20.090	1281.55	
19	15.1	5.738	4.530	13.137	12.684	661.88	
20	12.5	4.250	4.000	8.875	12.375	1048.78	
21	8.2	1.886	2.870	7.134	6.560	1011.14	
22	14.1	3.384	3.948	13.395	10.857	1110.61	
23	9.6	2.208	2.784	8.448	8.448	777.18	
24	17.6	2.640	5.456	1.760	17.600	896.07	
25	16.1	6.923	5.474	14.812	13.524	790.32	
26	21.4	8.346	9.416	17.976	18.190	816.21	

27	14.9	1.937	5.215	13.857	13.410	732.28
28	14.7	5.439	4.704	13.965	14.553	1029.87
29	11.6	4.060	3.480	10.092	9.628	746.54
30	11.2	1.792	3.136	9.632	8.736	1301.52
31	18.4	3.496	4.968	12.328	18.032	869.85
32	12.3	3.936	3.567	10.824	9.840	1234.31
33	16.8	6.552	5.208	15.792	13.608	708.24
34	23.9	5.497	10.038	23.661	20.554	688.75
35	14.1	3.948	4.794	13.959	11.562	697.73
36	19.9	6.368	5.771	18.308	18.706	881.51
37	12.8	4.224	3.328	8.576	11.520	804.71
38	18.2	9.100	5.642	17.472	16.016	905.99
39	11.1	3.774	4.218	10.212	8.769	1148.99
40	23.9	9.082	9.799	22.944	19.359	858.97
41	19.4	6.014	6.402	19.012	16.684	669.31
42	19.5	4.095	5.655	15.990	15.795	767.91
43	19.4	7.760	7.372	17.654	16.878	1004.75
44	11.3	4.859	1.808	9.944	10.848	809.38
45	13.6	4.080	4.080	13.056	12.920	716.20
46	12.7	2.413	3.429	11.049	11.176	768.95
47	10.6	4.452	3.498	8.692	9.116	890.03
48	23.8	8.092	6.664	23.086	20.706	992.61
49	13.8	4.968	4.554	5.382	11.592	670.31
50	17.4	7.308	5.568	14.094	15.660	791.14

	ins_losses	abbrev
0	145.08	AL
1	133.93	AK
2	110.35	AZ
3	142.39	AR
4	165.63	CA
5	139.91	CO
6	167.02	CT
7	151.48	DE
8	136.05	DC
9	144.18	FL
10	142.80	GA
11	120.92	HI
12	82.75	ID
13	139.15	IL
14	108.92	IN
15	114.47	IA
16	133.80	KS
17	137.13	KY
18	194.78	LA
19	96.57	ME
20	192.70	MD

```
21      135.63     MA
22      152.26     MI
23      133.35     MN
24      155.77     MS
25      144.45     MO
26       85.15     MT
27      114.82     NE
28      138.71     NV
29      120.21     NH
30      159.85     NJ
31      120.75     NM
32      150.01     NY
33      127.82     NC
34      109.72     ND
35      133.52     OH
36      178.86     OK
37      104.61     OR
38      153.86     PA
39      148.58     RI
40      116.29     SC
41       96.87     SD
42      155.57     TN
43      156.83     TX
44      109.48     UT
45      109.61     VT
46      153.72     VA
47      111.62     WA
48      152.56     WV
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 51 entries, 0 to 50
Data columns (total 8 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   total           51 non-null     float64
 1   speeding        51 non-null     float64
 2   alcohol         51 non-null     float64
 3   not_distracted  51 non-null     float64
 4   no_previous     51 non-null     float64
 5   ins_premium     51 non-null     float64
 6   ins_losses      51 non-null     float64
 7   abbrev          51 non-null     object
dtypes: float64(7), object(1)
```

```
memory usage: 3.3+ KB
```

[ ]:
```
ak.head()
```

[ ]:
```
    total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
0    18.8     7.332    5.640          18.048       15.040       784.55
1    18.1     7.421    4.525          16.290       17.014      1053.48
2    18.6     6.510    5.208          15.624       17.856       899.47
3    22.4     4.032    5.824          21.056       21.280       827.34
4    12.0     4.200    3.360          10.920       10.680       878.41

   ins_losses abbrev
0      145.08     AL
1      133.93     AK
2      110.35     AZ
3      142.39     AR
4      165.63     CA
```

[ ]:
```
ak.head(2)
```

[ ]:
```
    total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
0    18.8     7.332    5.640          18.048       15.040       784.55
1    18.1     7.421    4.525          16.290       17.014      1053.48

   ins_losses abbrev
0      145.08     AL
1      133.93     AK
```

[ ]:
```
ak.tail(8)
```

[ ]:
```
     total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
43    19.4     7.760    7.372          17.654       16.878      1004.75
44    11.3     4.859    1.808           9.944       10.848       809.38
45    13.6     4.080    4.080          13.056       12.920       716.20
46    12.7     2.413    3.429          11.049       11.176       768.95
47    10.6     4.452    3.498           8.692        9.116       890.03
48    23.8     8.092    6.664          23.086       20.706       992.61
49    13.8     4.968    4.554           5.382       11.592       670.31
50    17.4     7.308    5.568          14.094       15.660       791.14

    ins_losses abbrev
43      156.83     TX
44      109.48     UT
45      109.61     VT
46      153.72     VA
47      111.62     WA
48      152.56     WV
```

```
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.tail()
```

[ ]:
```
    total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
46   12.7     2.413    3.429          11.049       11.176       768.95
47   10.6     4.452    3.498           8.692        9.116       890.03
48   23.8     8.092    6.664          23.086       20.706       992.61
49   13.8     4.968    4.554           5.382       11.592       670.31
50   17.4     7.308    5.568          14.094       15.660       791.14

    ins_losses abbrev
46      153.72     VA
47      111.62     WA
48      152.56     WV
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.shape
```

[ ]:
```
(51, 8)
```

[ ]:
```
ak.describe()
```

[ ]:
```
           total   speeding    alcohol  not_distracted  no_previous  \
count  51.000000  51.000000  51.000000       51.000000    51.000000
mean   15.790196   4.998196   4.886784       13.573176    14.004882
std     4.122002   2.017747   1.729133        4.508977     3.764672
min     5.900000   1.792000   1.593000        1.760000     5.900000
25%    12.750000   3.766500   3.894000       10.478000    11.348000
50%    15.600000   4.608000   4.554000       13.857000    13.775000
75%    18.500000   6.439000   5.604000       16.140000    16.755000
max    23.900000   9.450000  10.038000       23.661000    21.280000

       ins_premium  ins_losses
count    51.000000   51.000000
mean    886.957647  134.493137
std     178.296285   24.835922
min     641.960000   82.750000
25%     768.430000  114.645000
50%     858.970000  136.050000
75%    1007.945000  151.870000
max    1301.520000  194.780000
```

[ ]:
```
corr = ak.corr()
corr
```

```
<ipython-input-12-cd014e0cc39d>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  corr = ak.corr()
```

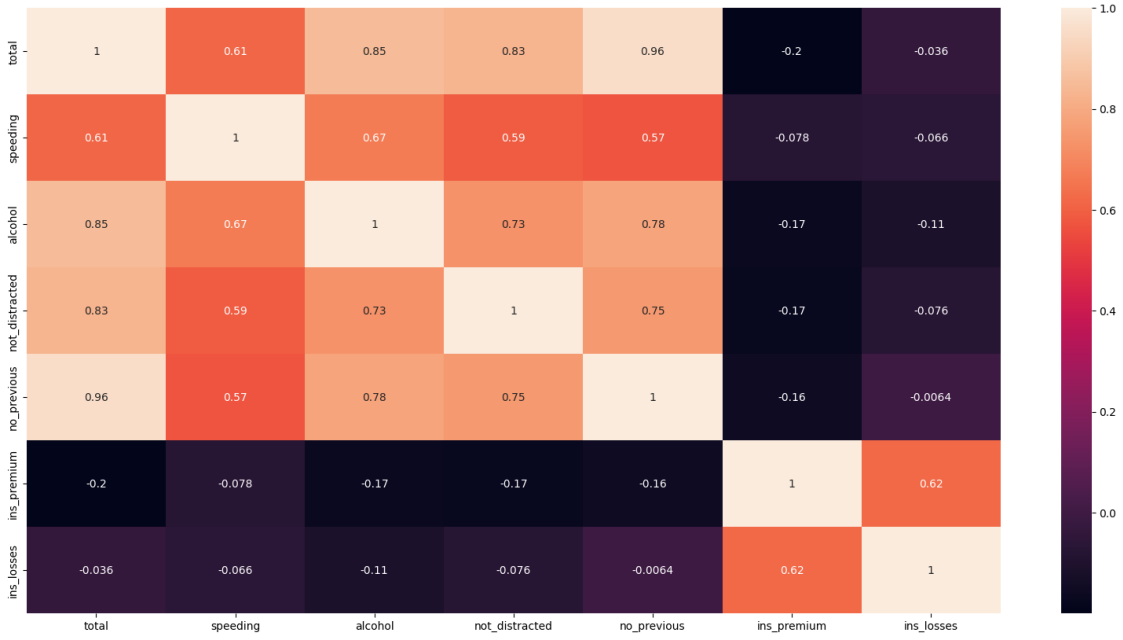
[ ]:

	total	speeding	alcohol	not_distracted	no_previous	\
total	1.000000	0.611548	0.852613	0.827560	0.956179	
speeding	0.611548	1.000000	0.669719	0.588010	0.571976	
alcohol	0.852613	0.669719	1.000000	0.732816	0.783520	
not_distracted	0.827560	0.588010	0.732816	1.000000	0.747307	
no_previous	0.956179	0.571976	0.783520	0.747307	1.000000	
ins_premium	-0.199702	-0.077675	-0.170612	-0.174856	-0.156895	
ins_losses	-0.036011	-0.065928	-0.112547	-0.075970	-0.006359	

	ins_premium	ins_losses
total	-0.199702	-0.036011
speeding	-0.077675	-0.065928
alcohol	-0.170612	-0.112547
not_distracted	-0.174856	-0.075970
no_previous	-0.156895	-0.006359
ins_premium	1.000000	0.623116
ins_losses	0.623116	1.000000

[ ]:
```
plt.subplots(figsize = (20,10))
sns.heatmap(corr,annot=True)
```

[ ]: <Axes: >



[ ]:
```
ak["total"].value_counts()
```

[ ]:
```
14.1    2
12.8    2
13.6    2
21.4    2
19.4    2
23.9    2
14.9    1
14.7    1
11.6    1
11.2    1
18.4    1
12.3    1
16.8    1
19.9    1
17.6    1
18.2    1
11.1    1
19.5    1
11.3    1
12.7    1
10.6    1
23.8    1
13.8    1
16.1    1
18.8    1
9.6     1
18.1    1
18.6    1
22.4    1
12.0    1
10.8    1
16.2    1
5.9     1
17.9    1
15.6    1
17.5    1
15.3    1
14.5    1
15.7    1
17.8    1
20.5    1
15.1    1
12.5    1
```

```
8.2     1
17.4    1
Name: total, dtype: int64
```

[ ]:
```
ak.alcohol.value_counts()
```

[ ]:
```
5.208     2
5.640     1
4.218     1
4.704     1
3.480     1
3.136     1
4.968     1
3.567     1
10.038    1
4.794     1
5.771     1
3.328     1
5.642     1
9.799     1
9.416     1
6.402     1
5.655     1
7.372     1
1.808     1
4.080     1
3.429     1
3.498     1
6.664     1
4.554     1
5.215     1
5.474     1
4.525     1
5.456     1
5.824     1
3.360     1
3.808     1
3.888     1
4.860     1
1.593     1
5.191     1
3.900     1
7.175     1
4.437     1
4.352     1
4.205     1
3.925     1
```

```
4.272     1
4.922     1
6.765     1
4.530     1
4.000     1
2.870     1
3.948     1
2.784     1
5.568     1
Name: alcohol, dtype: int64
```

[ ]:
```
ak.isnull().any()
```

[ ]:
```
total             False
speeding          False
alcohol           False
not_distracted    False
no_previous       False
ins_premium       False
ins_losses        False
abbrev            False
dtype: bool
```

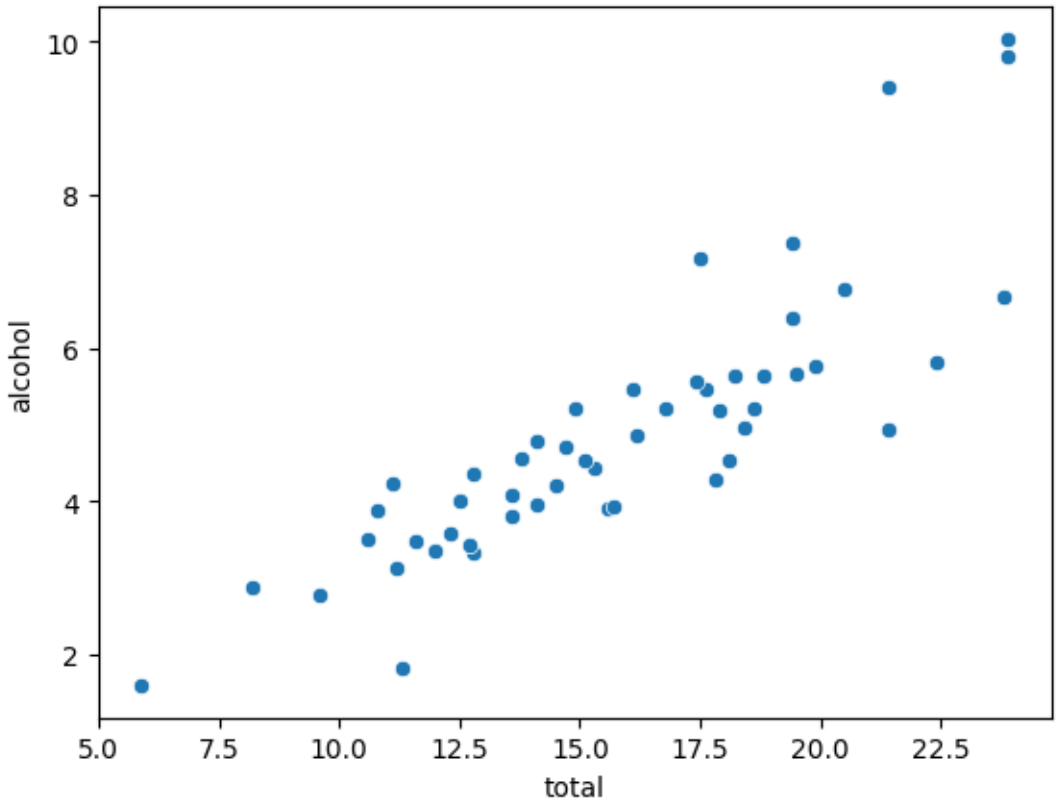
[ ]:
```
ak.isnull().sum()
```

[ ]:
```
total             0
speeding          0
alcohol           0
not_distracted    0
no_previous       0
ins_premium       0
ins_losses        0
abbrev            0
dtype: int64
```

DATA VISUALIZAION

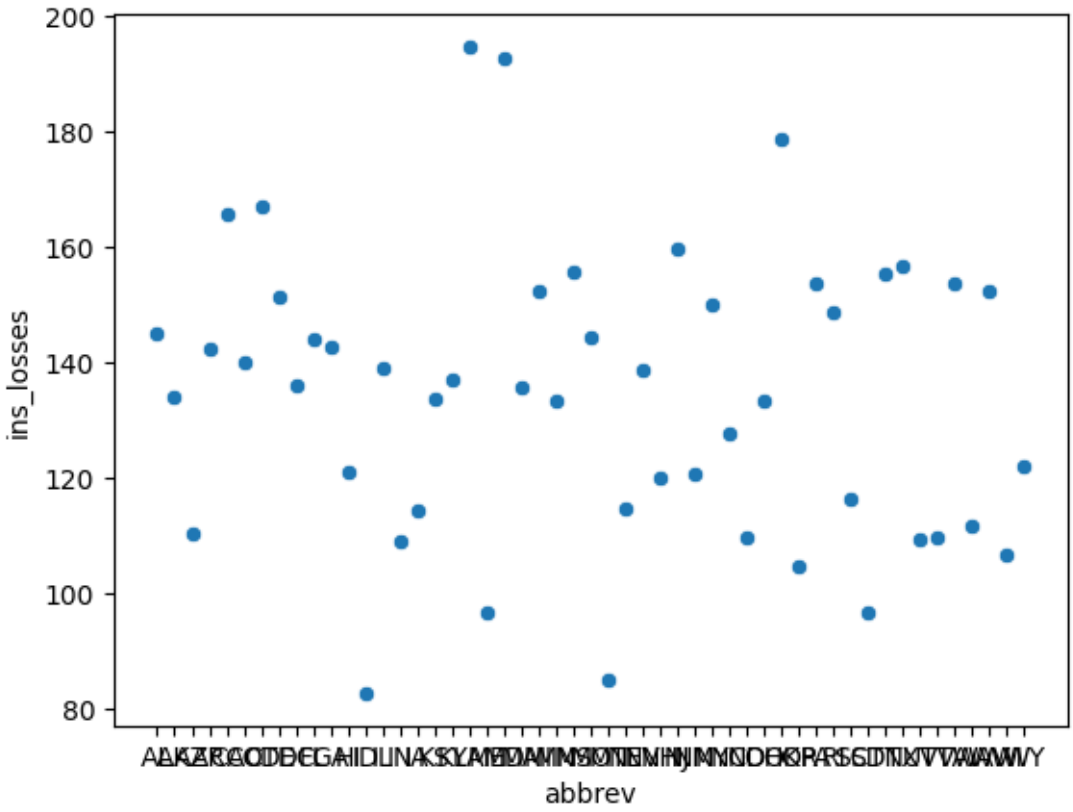
[ ]:
```
sns.scatterplot(x="total",y="alcohol", data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='alcohol'>
```



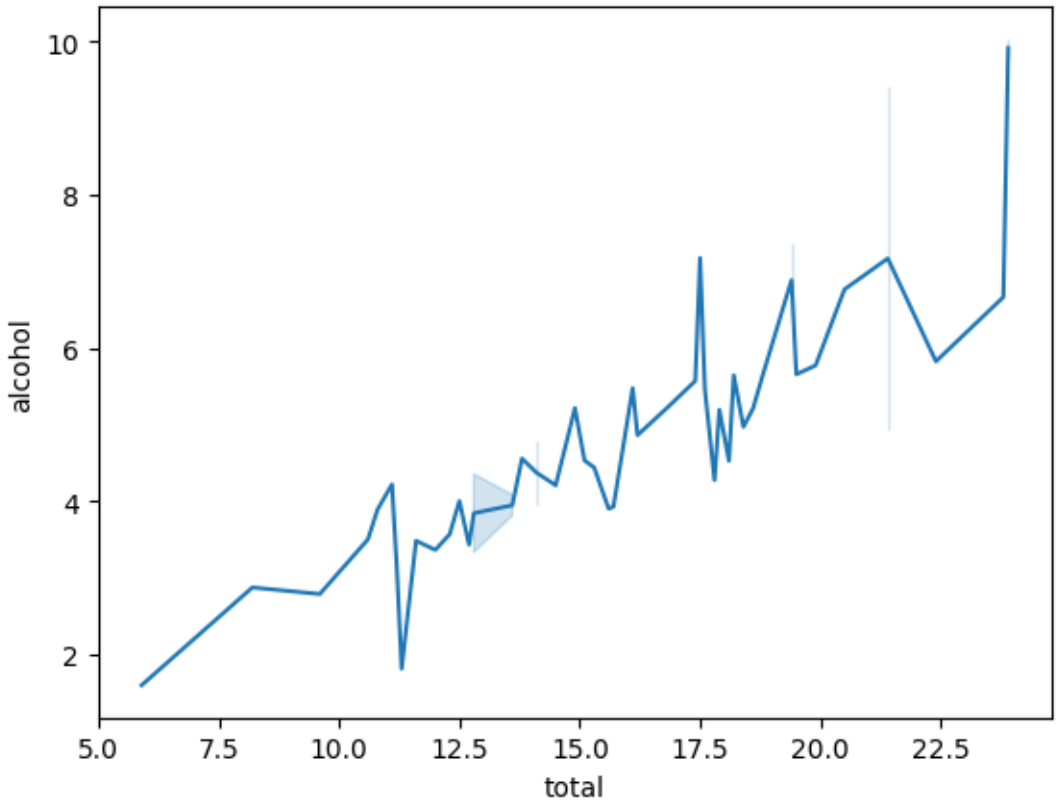
[ ]:
```
sns.scatterplot(x="abbrev",y="ins_losses",data=ak)
```

[ ]:
```
<Axes: xlabel='abbrev', ylabel='ins_losses'>
```



[ ]:
```
#Lineplot
sns.lineplot(y="alcohol",x="total",data=ak)
```

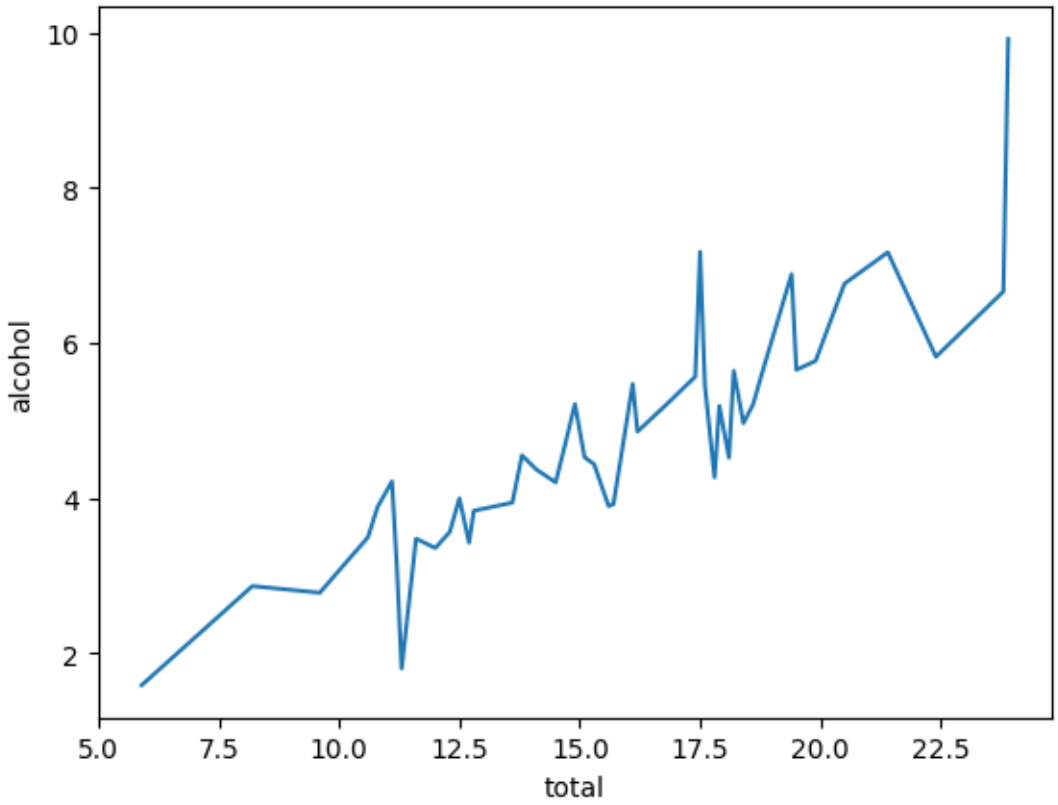
[ ]:
```
<Axes: xlabel='total', ylabel='alcohol'>
```



[ ]:
```
#Lineplot
sns.lineplot(y="alcohol",x="total",data=ak,ci=None)
```

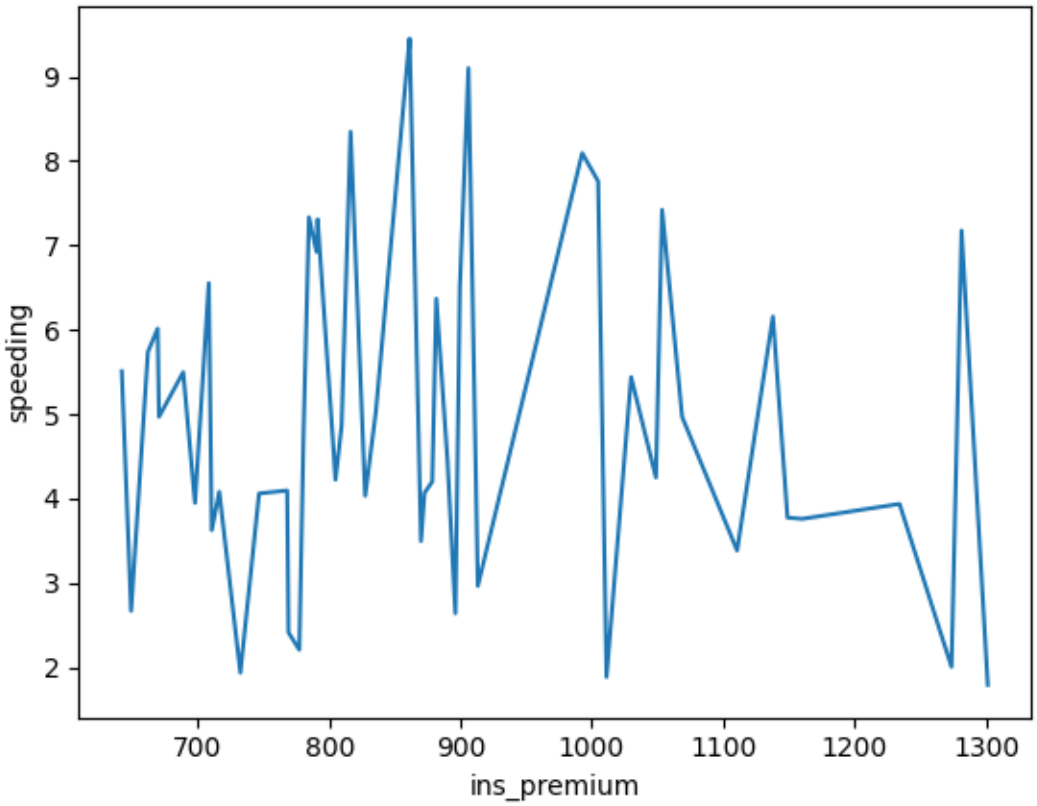
```
<ipython-input-21-d491e3384d9c>:2: FutureWarning:

The `ci` parameter is deprecated. Use `errorbar=None` for the same effect.

  sns.lineplot(y="alcohol",x="total",data=ak,ci=None)
```

[ ]: <Axes: xlabel='total', ylabel='alcohol'>



[ ]:
```
sns.lineplot(x="ins_premium",y="speeding",data=ak)
```

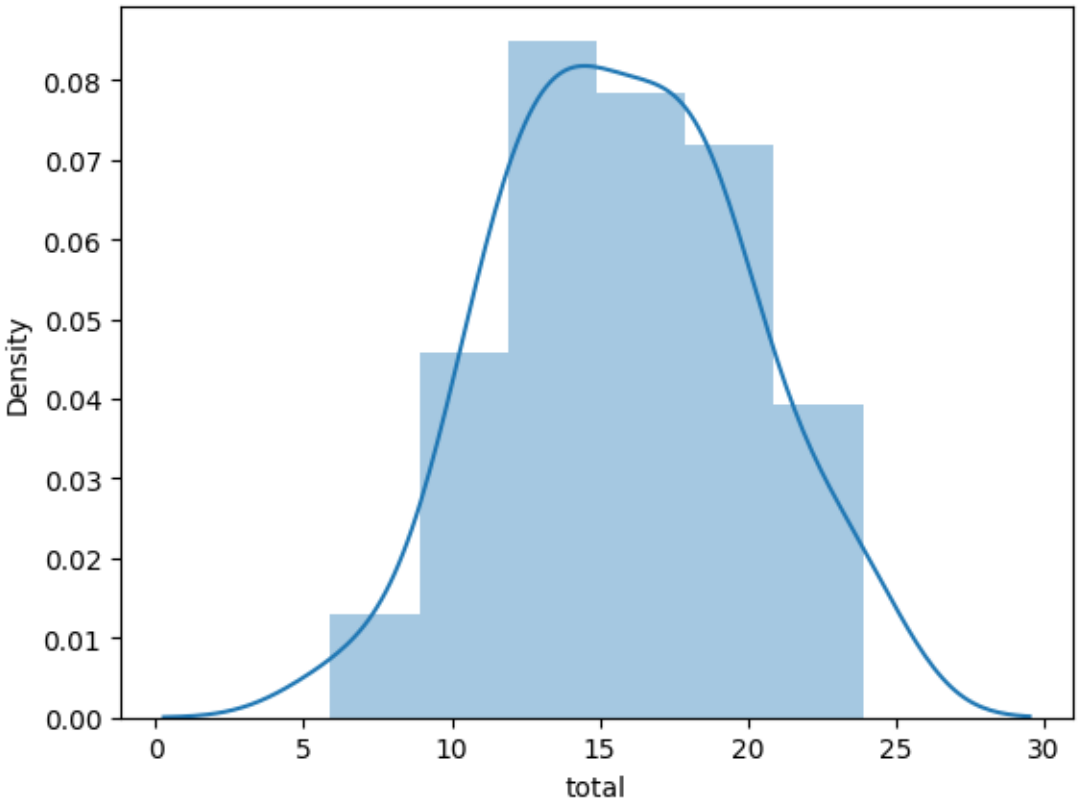
[ ]:
```
<Axes: xlabel='ins_premium', ylabel='speeding'>
```



[ ]:
```
#Displot
sns.distplot(ak["total"])
```

```
<ipython-input-23-18a78abad740>:2: 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(ak["total"])
```

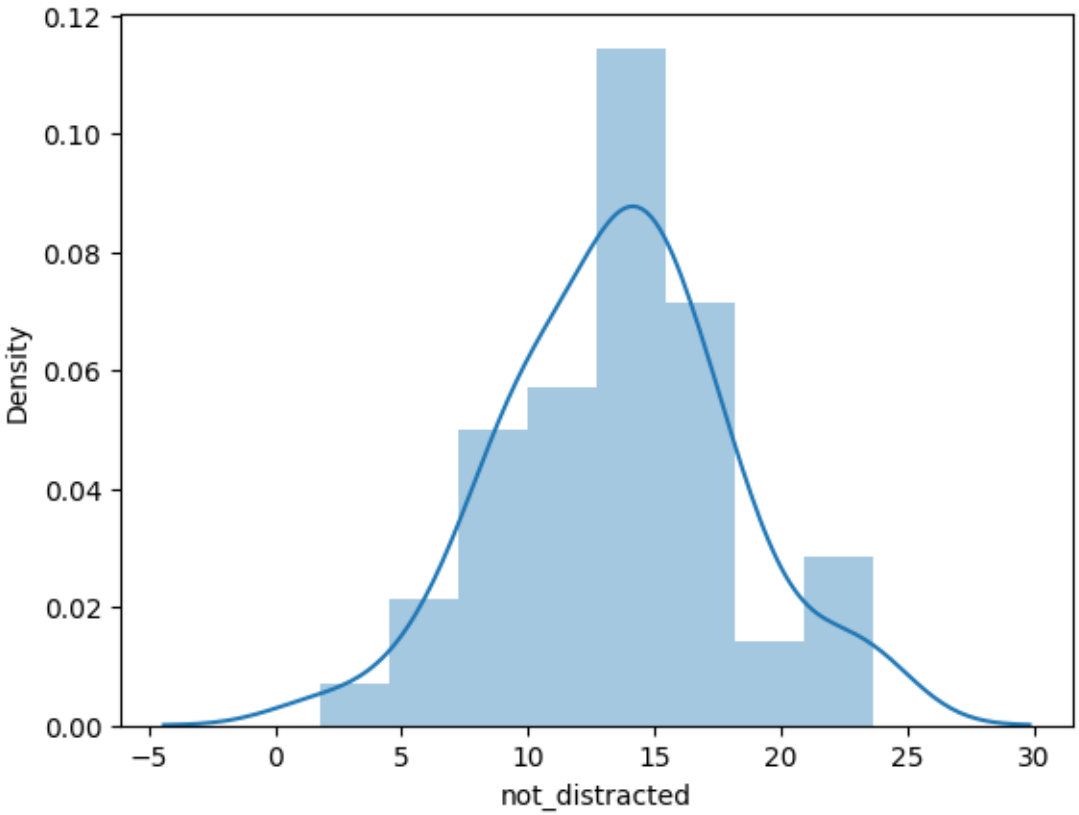
[ ]: <Axes: xlabel='total', ylabel='Density'>



[ ]:
```
sns.distplot(ak["not_distracted"])
```

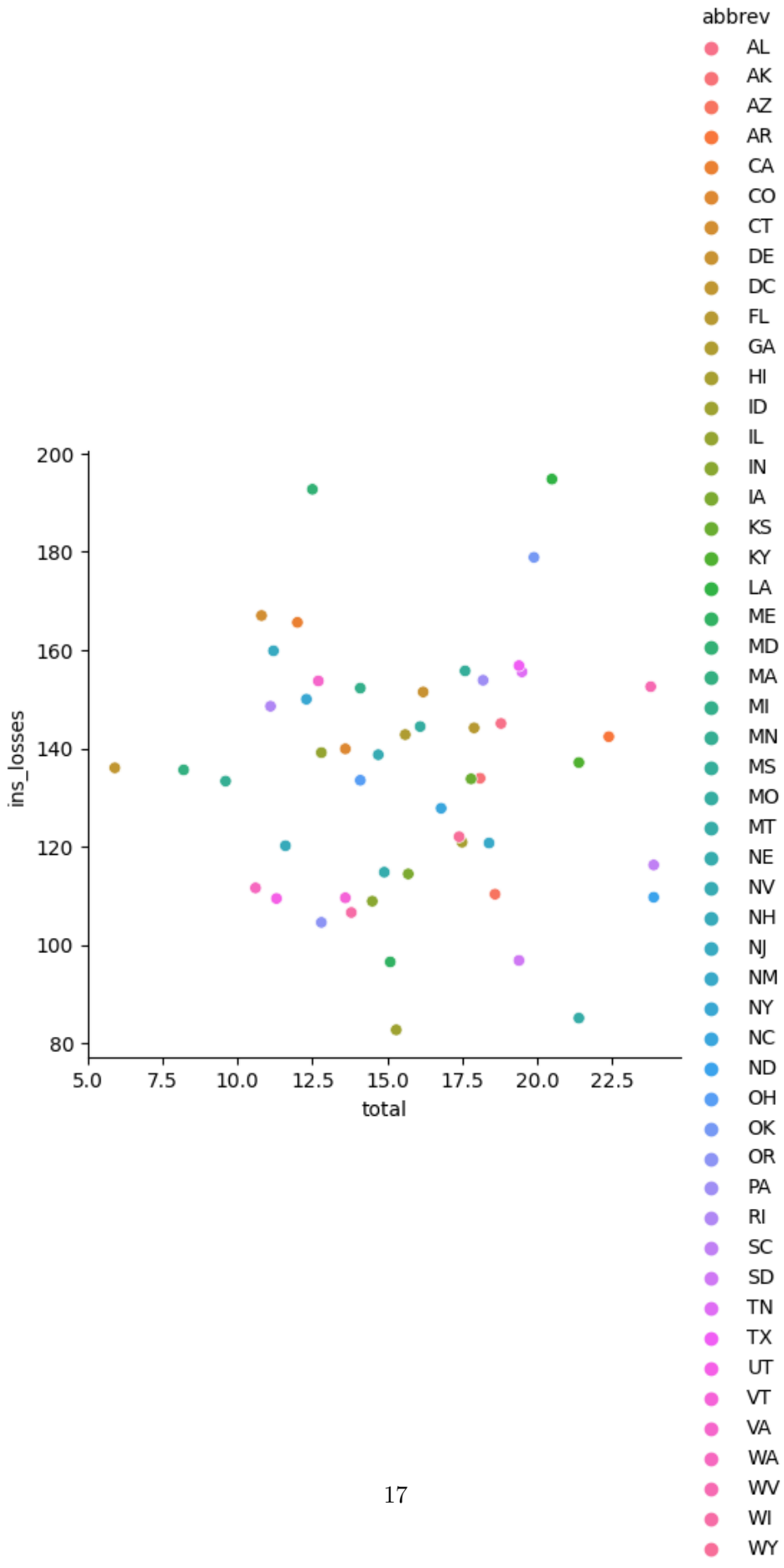
```
<ipython-input-24-bb0c8d7ed882>:1: UserWarning:

`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(ak["not_distracted"])
```

[ ]:
```
<Axes: xlabel='not_distracted', ylabel='Density'>
```



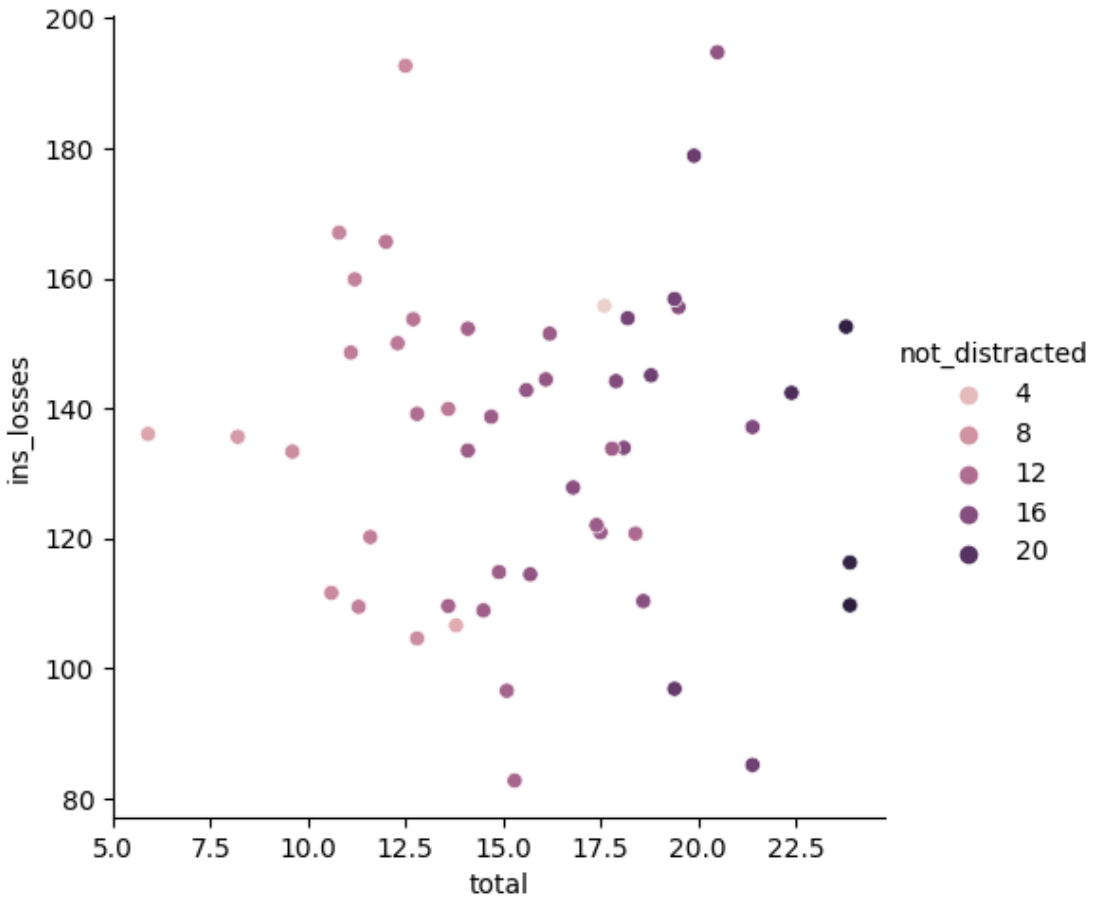
[ ]:
```
#Relationplot
sns.relplot(x="total",y="ins_losses",data=ak,hue="abbrev")
```

[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x7e3d2e3066b0>
```


ins_losses
total
200
180
160
140
120
100
80
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
abbrev
AL
AK
AZ
AR
CA
CO
CT
DE
DC
FL
GA
HI
ID
IL
IN
IA
KS
KY
LA
ME
MD
MA
MI
MN
MS
MO
MT
NE
NV
NH
NJ
NM
NY
NC
ND
OH
OK
OR
PA
RI
SC
SD
TN
TX
UT
VT
VA
WA
WV
WI
WY

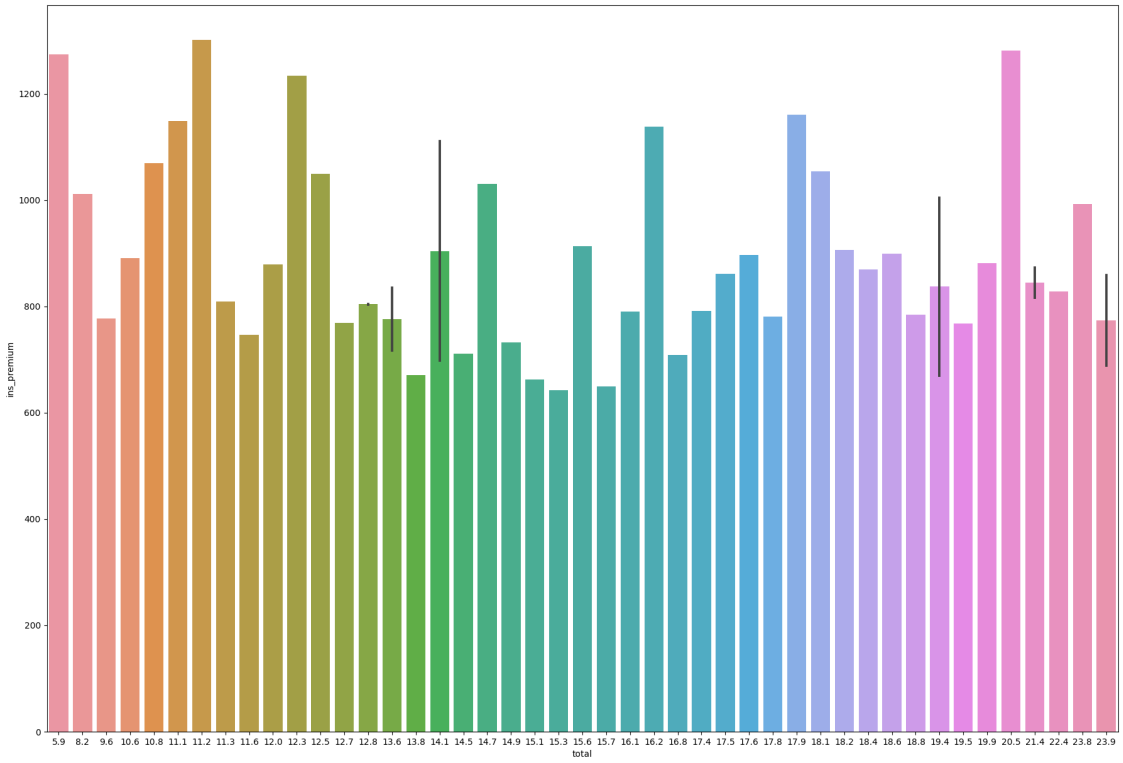
[ ]:
```
#Relationplot
sns.relplot(x="total",y="ins_losses",data=ak,hue="not_distracted")
```

[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x7e3d2e496fe0>
```



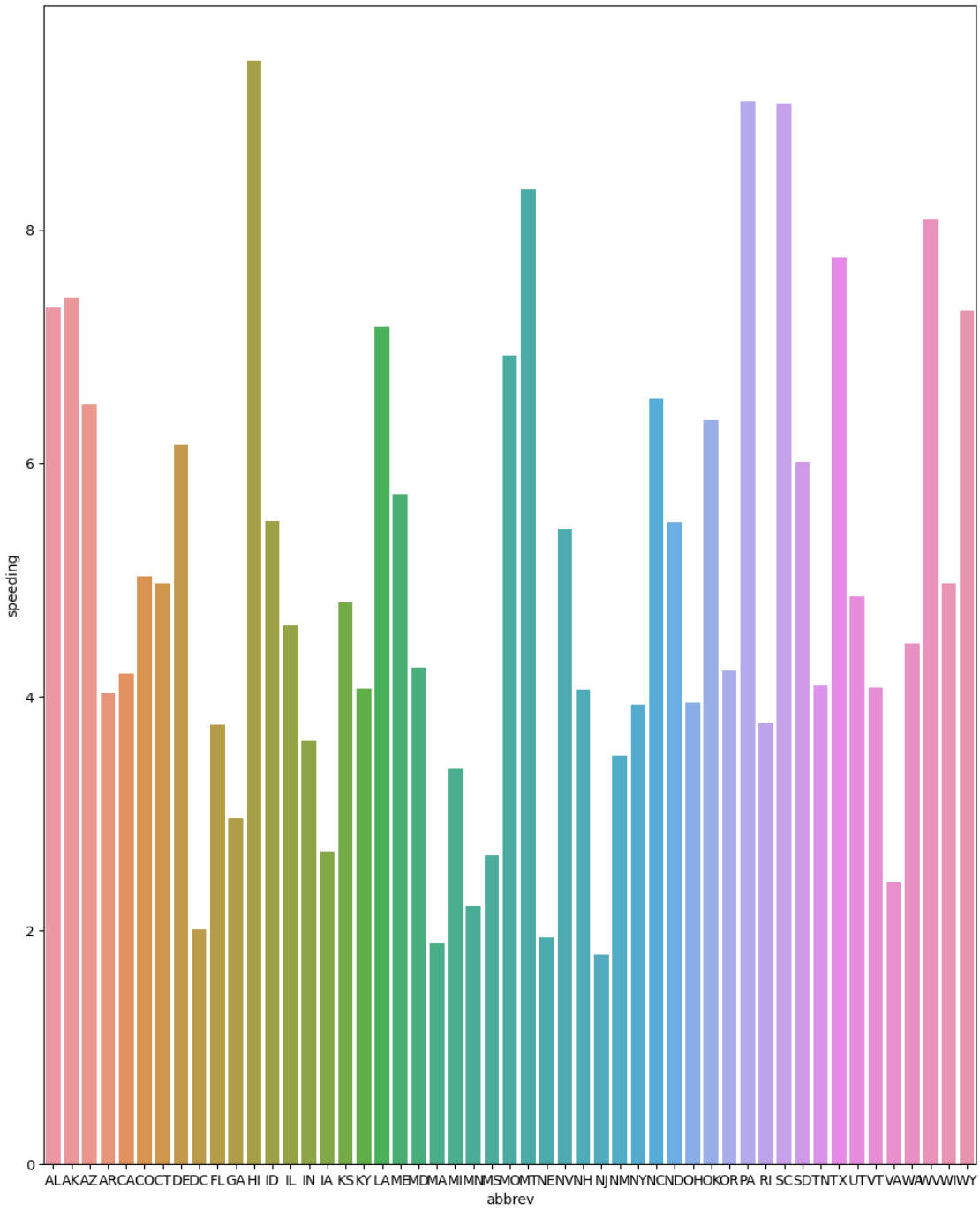
[ ]:
```
#barplot
plt.subplots(figsize=(22,15))
sns.barplot(x="total",y="ins_premium",data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='ins_premium'>
```



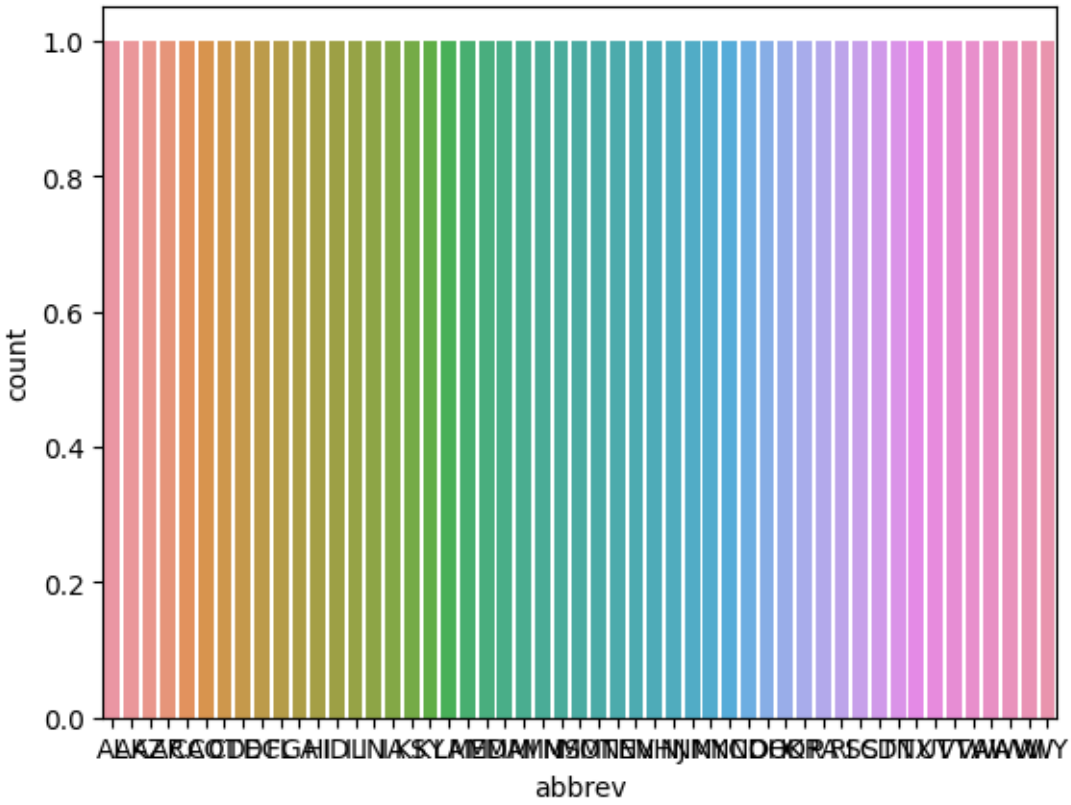
[ ]:
```
#barplot
plt.subplots(figsize=(12,15))
sns.barplot(y="speeding",x="abbrev",data=ak)
```

[ ]: <Axes: xlabel='abbrev', ylabel='speeding'>



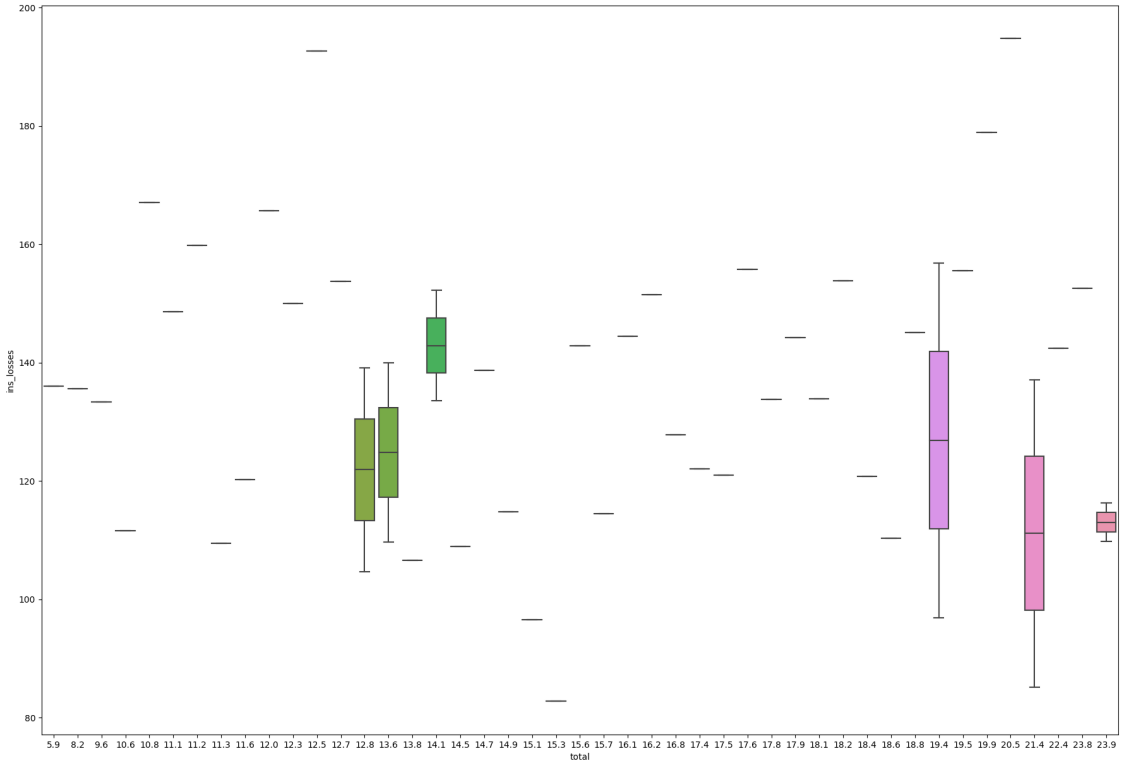
[ ]:
```
#Count Plot
sns.countplot(x="abbrev",data=ak)
```

[ ]:
```
<Axes: xlabel='abbrev', ylabel='count'>
```



[ ]:
```
#boxplot
plt.subplots(figsize=(22,15))
sns.boxplot(x="total",y="ins_losses",data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='ins_losses'>
```


ins_losses
total
200
180
160
140
120
100
80
5.9 8.2 9.6 10.6 10.8 11.1 11.2 11.3 11.6 12.0 12.3 12.5 12.7 12.8 13.6 13.8 14.1 14.5 14.7 14.9 15.1 15.3 15.6 15.7 16.1 16.2 16.8 17.4 17.5 17.6 17.8 17.9 18.1 18.2 18.4 18.6 18.8 19.4 19.5 19.9 20.5 21.4 22.4 23.8 23.9