

In [1]:

```
import pandas as pd
```

In [2]:

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

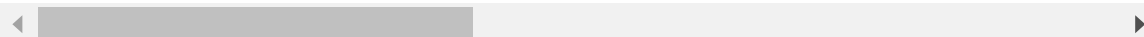
In [3]:

```
df.head()
```

Out[3]:

	serial	tempmax	tempmin	temp	feelslikemax	feelslikemin	feelslike	dew
0	0	34.053151	24.478082	28.709863	39.757808	25.317808	32.306301	22.971233
1	1	34.086179	25.694309	29.464228	41.338211	28.140650	34.423577	23.484553
2	2	34.573984	25.417886	29.526829	40.464228	26.560163	33.085366	22.580488
3	3	33.020325	25.080488	28.727642	37.878049	26.193496	31.772358	21.752033
4	4	30.660976	24.230894	26.774797	36.586992	24.263415	28.943902	24.214634

5 rows × 26 columns



In [4]:

```
df.tail()
```

Out[4]:

	serial	tempmax	tempmin	temp	feelslikemax	feelslikemin	feelslike	dew	humidity	p
597	597	32.3	24.4	28.5	35.9	24.4	31.2	23.3	75.0	
598	598	32.7	26.4	29.3	36.3	26.4	32.5	22.6	68.5	
599	599	33.0	26.3	29.8	40.5	26.3	34.5	23.9	71.1	
600	600	35.1	26.8	30.6	42.9	29.1	35.1	23.3	65.9	
601	601	34.0	26.3	30.2	38.1	26.3	33.1	21.5	60.4	

5 rows × 26 columns



In [5]:

```
df = df.drop('serial', axis = 1)
```

In [6]:

```
df.shape
```

Out[6]:

```
(602, 25)
```

In [7]:

```
df.columns
```

Out[7]:

```
Index(['tempmax', 'tempmin', 'temp', 'feelslikemax', 'feelslikemin',  
      'feelslike', 'dew', 'humidity', 'precip', 'precipprob', 'precipcove  
r',  
      'snow', 'snowdepth', 'windspeed', 'winddir', 'sealevelpressure',  
      'cloudcover', 'visibility', 'solarradiation', 'solarenergy', 'uvind  
ex',  
      'conditions', 'stations', 'cases', 'labels'],  
      dtype='object')
```

In [8]:

```
df.duplicated().sum()
```

Out[8]:

```
0
```

In [9]:

```
df.isnull().sum()
```

Out[9]:

tempmax	0
tempmin	0
temp	0
feelslikemax	0
feelslikemin	0
feelslike	0
dew	0
humidity	0
precip	0
precipprob	0
precipcover	0
snow	0
snowdepth	0
windspeed	0
winddir	0
sealevelpressure	0
cloudcover	0
visibility	0
solarradiation	0
solarenergy	0
uvindex	0
conditions	0
stations	0
cases	0
labels	0

dtype: int64

In [10]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 602 entries, 0 to 601
Data columns (total 25 columns):
#   Column                Non-Null Count  Dtype  
---  -
0   tempmax                602 non-null   float64
1   tempmin                602 non-null   float64
2   temp                   602 non-null   float64
3   feelslikemax           602 non-null   float64
4   feelslikemin           602 non-null   float64
5   feelslike              602 non-null   float64
6   dew                    602 non-null   float64
7   humidity               602 non-null   float64
8   precip                 602 non-null   float64
9   precipprob             602 non-null   float64
10  precipcover            602 non-null   float64
11  snow                   602 non-null   int64   
12  snowdepth              602 non-null   int64   
13  windspeed              602 non-null   float64
14  winddir                602 non-null   float64
15  sealevelpressure       602 non-null   float64
16  cloudcover             602 non-null   float64
17  visibility              602 non-null   float64
18  solarradiation         602 non-null   float64
19  solarenergy            602 non-null   float64
20  uvindex                602 non-null   float64
21  conditions              602 non-null   float64
22  stations                602 non-null   float64
23  cases                  602 non-null   int64   
24  labels                  602 non-null   object  
dtypes: float64(21), int64(3), object(1)
memory usage: 117.7+ KB
```

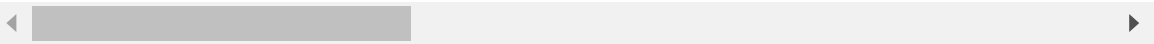
In [11]:

```
df.describe()
```

Out[11]:

	tempmax	tempmin	temp	feelslikemax	feelslikemin	feelslike	dew
count	602.000000	602.000000	602.000000	602.000000	602.000000	602.000000	602.000000
mean	31.918079	24.588318	27.813181	38.476069	25.613154	31.485111	23.984345
std	2.737215	2.727919	2.412416	4.776400	4.178797	4.672951	2.668014
min	25.000000	12.740000	18.820000	25.000000	12.360000	18.626667	4.480000
25%	30.025000	23.200000	26.500000	35.600000	23.200000	28.100000	23.300000
50%	31.700000	25.000000	27.900000	38.400000	25.000000	31.500000	24.529268
75%	33.600000	26.500000	29.448171	41.900000	26.600000	34.875000	25.475000
max	41.200000	29.400000	33.300000	49.600000	37.900000	42.900000	28.100000

8 rows × 24 columns



In [12]:

```
df.nunique()
```

Out[12]:

tempmax	118
tempmin	126
temp	125
feelslikemax	192
feelslikemin	157
feelslike	202
dew	123
humidity	295
precip	207
precipprob	17
precipcover	35
snow	1
snowdepth	1
windspeed	165
winddir	539
sealevelpressure	221
cloudcover	408
visibility	77
solarradiation	523
solarenergy	196
uvindex	24
conditions	20
stations	17
cases	578
labels	1
dtype:	int64

In [13]:

```
for i in range(df.shape[0]):
    if df.loc[i, 'cases'] > 19000:
        df.loc[i, 'labels'] = 'Severe Risk'
    elif df.loc[i, 'cases'] > 10000:
        df.loc[i, 'labels'] = 'High Risk'
    elif df.loc[i, 'cases'] > 5000:
        df.loc[i, 'labels'] = 'Moderate Risk'
    elif df.loc[i, 'cases'] > 1000:
        df.loc[i, 'labels'] = 'Low Risk'
    else:
        df.loc[i, 'labels'] = 'Minimal to No risk'
```

In [14]:

```
df.nunique()
```

Out[14]:

tempmax	118
tempmin	126
temp	125
feelslikemax	192
feelslikemin	157
feelslike	202
dew	123
humidity	295
precip	207
precipprob	17
precipcover	35
snow	1
snowdepth	1
windspeed	165
winddir	539
sealevelpressure	221
cloudcover	408
visibility	77
solarradiation	523
solarenergy	196
uvindex	24
conditions	20
stations	17
cases	578
labels	5
dtype:	int64

In [15]:

```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [16]:

```
import warnings
warnings.filterwarnings('ignore')
```

In [17]:

```
import numpy as np
```

In [18]:

```
df['labels'].unique()
```

Out[18]:

```
array(['Low Risk', 'Moderate Risk', 'High Risk', 'Minimal to No risk',
      'Severe Risk'], dtype=object)
```

In [19]:

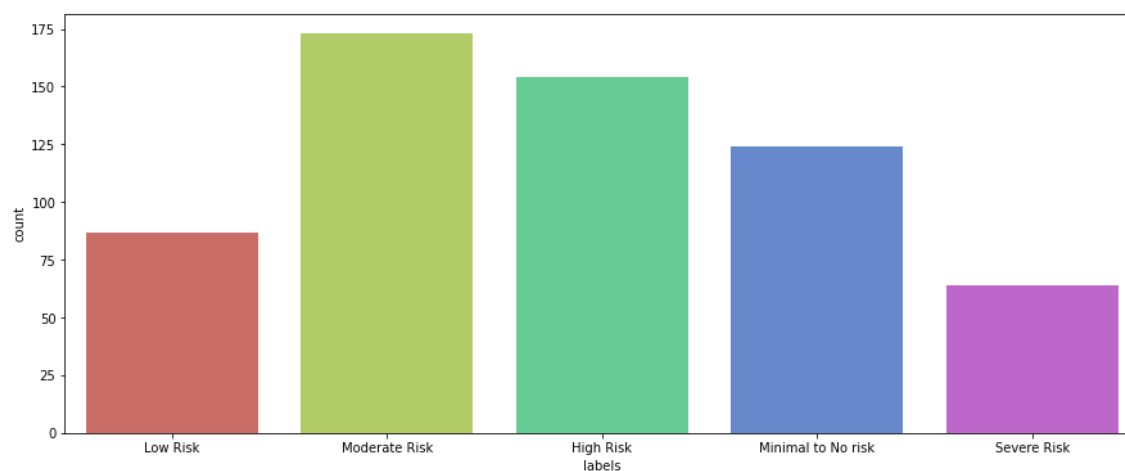
```
df['labels'].value_counts()
```

Out[19]:

```
Moderate Risk      173
High Risk          154
Minimal to No risk 124
Low Risk           87
Severe Risk        64
Name: labels, dtype: int64
```

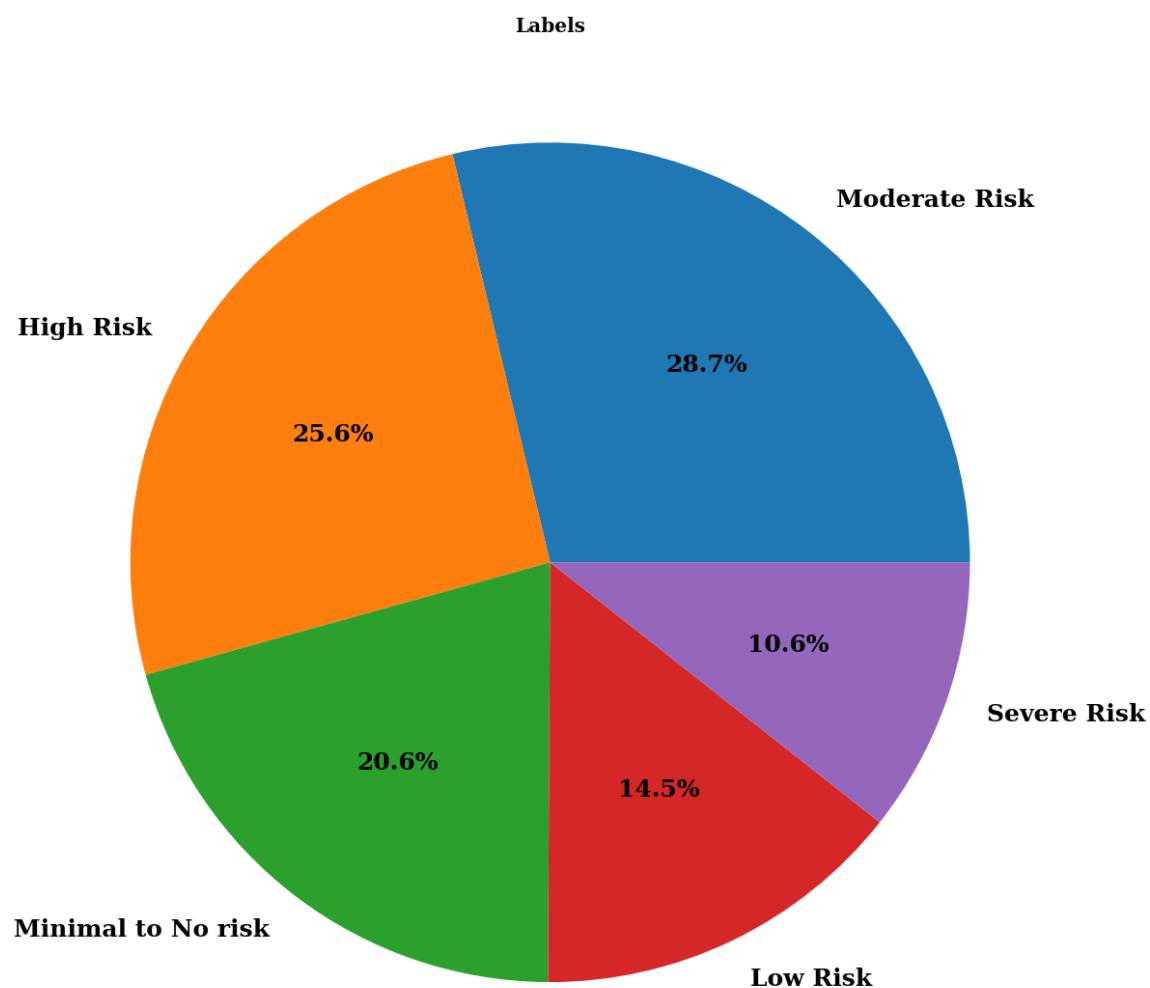
In [20]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['labels'], data = df, palette = 'hls')
plt.show()
```



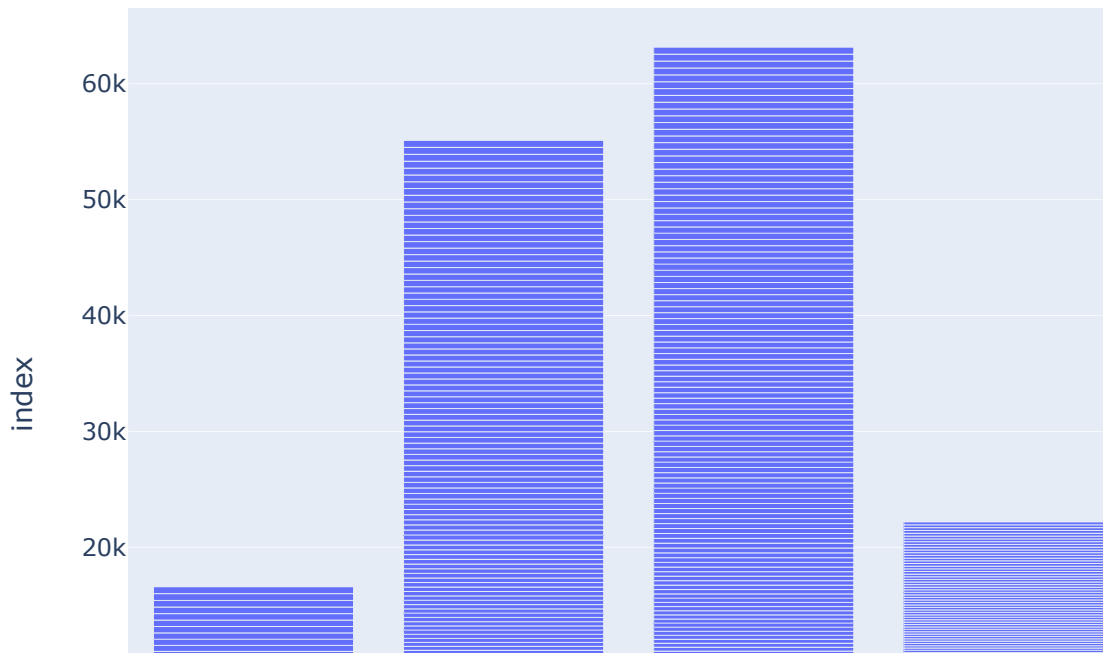
In [21]:

```
plt.figure(figsize=(30,20))
plt.pie(df['labels'].value_counts(), labels=df['labels'].value_counts().index, autopct='%1.1f%%',
        color='black',
        weight='bold',
        family='serif'})
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Labels', size=20, **hfont)
plt.show()
```



In [22]:

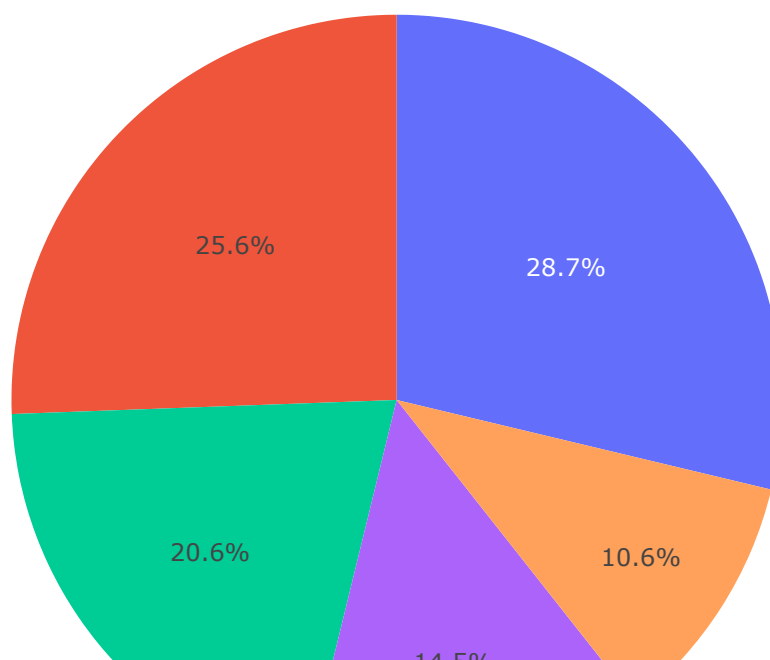
```
import plotly.express as px  
  
fig = px.bar(df, x="labels", y= df.index)  
fig.show()
```



In [23]:

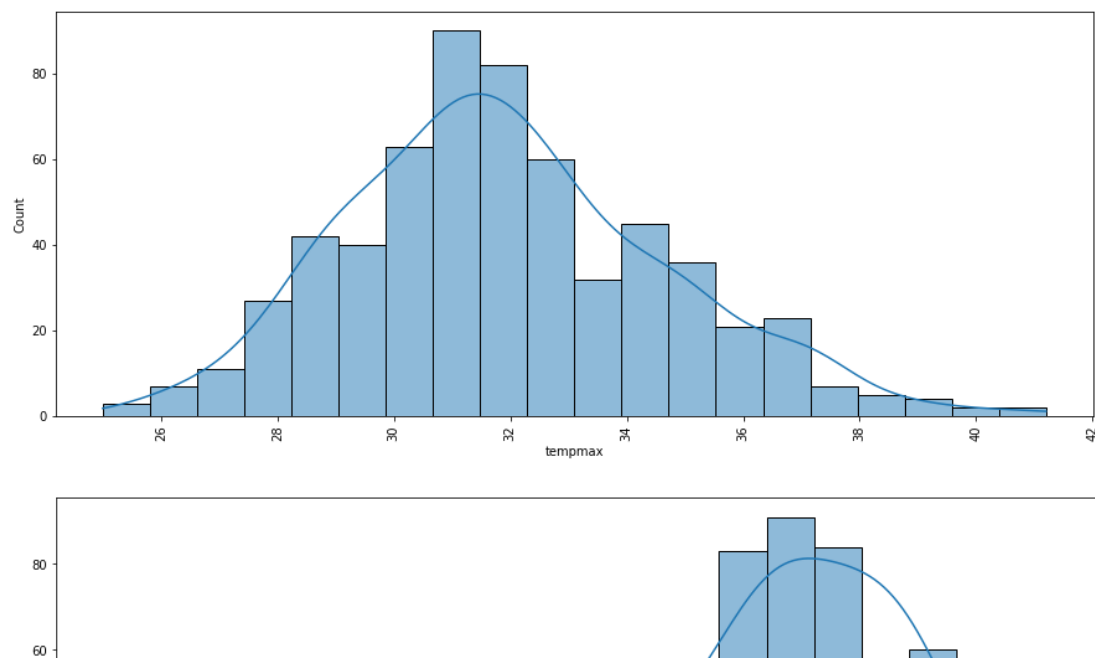
```
value_counts = df['labels'].value_counts()
fig = px.pie(names=value_counts.index, values=value_counts.values)
fig.update_layout(
    title='Pie Chart of Labels',
    title_x=0.5
)
fig.show()
```

Pie Chart of Labels



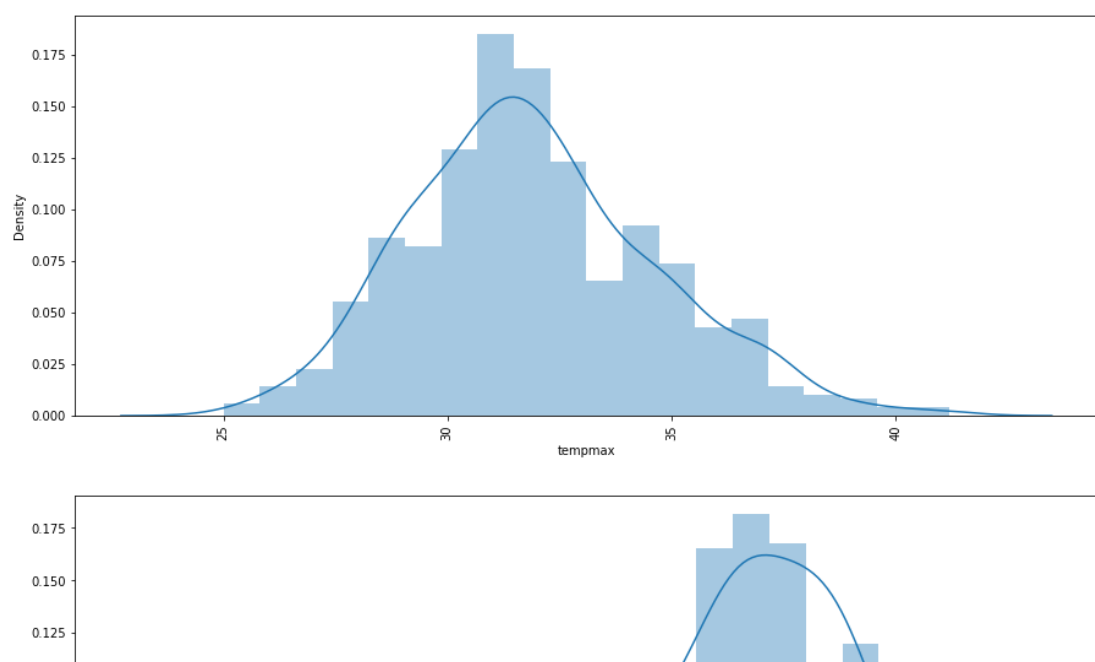
In [24]:

```
for i in df.columns:
    if i != 'labels':
        plt.figure(figsize=(15,6))
        sns.histplot(df[i], kde = True, bins = 20, palette = 'hls')
        plt.xticks(rotation = 90)
        plt.show()
```



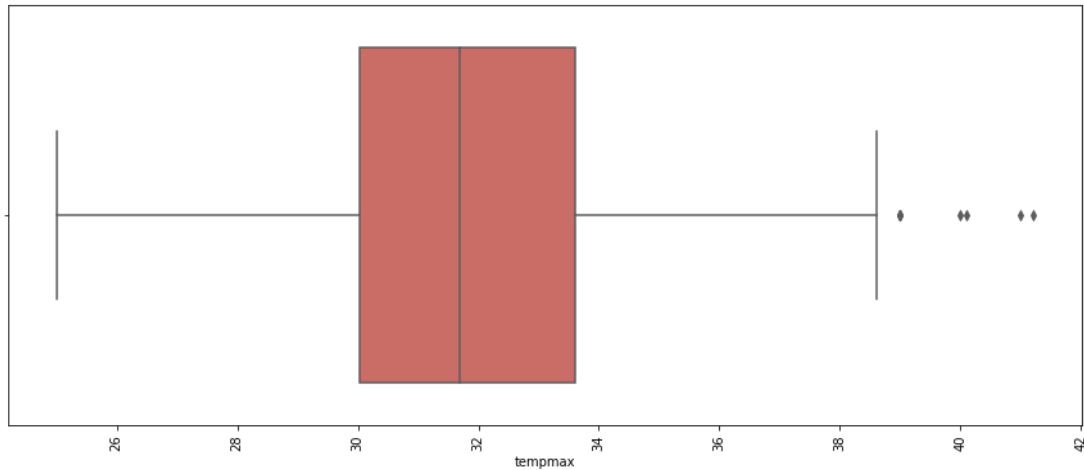
In [25]:

```
for i in df.columns:
    if i != 'labels':
        plt.figure(figsize=(15,6))
        sns.distplot(df[i], kde = True, bins = 20)
        plt.xticks(rotation = 90)
        plt.show()
```



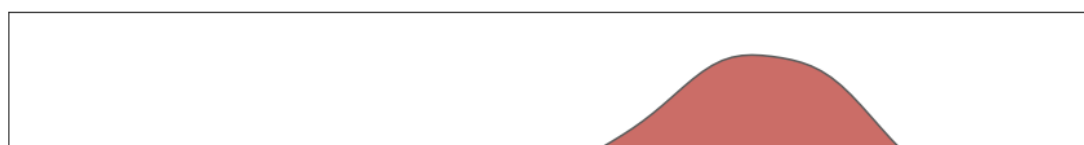
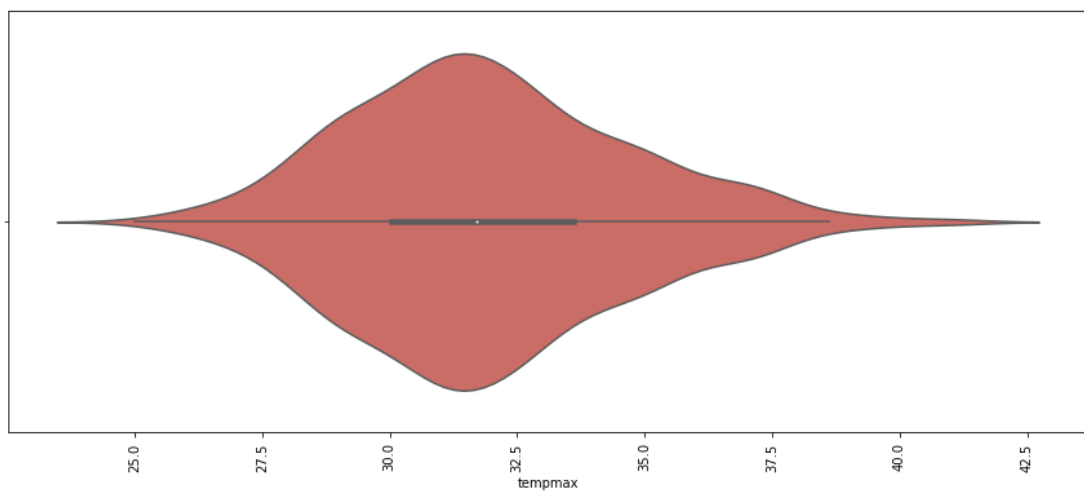
In [26]:

```
for i in df.columns:  
    if i != 'labels':  
        plt.figure(figsize=(15,6))  
        sns.boxplot(df[i], data = df, palette = 'hls')  
        plt.xticks(rotation = 90)  
        plt.show()
```



In [27]:

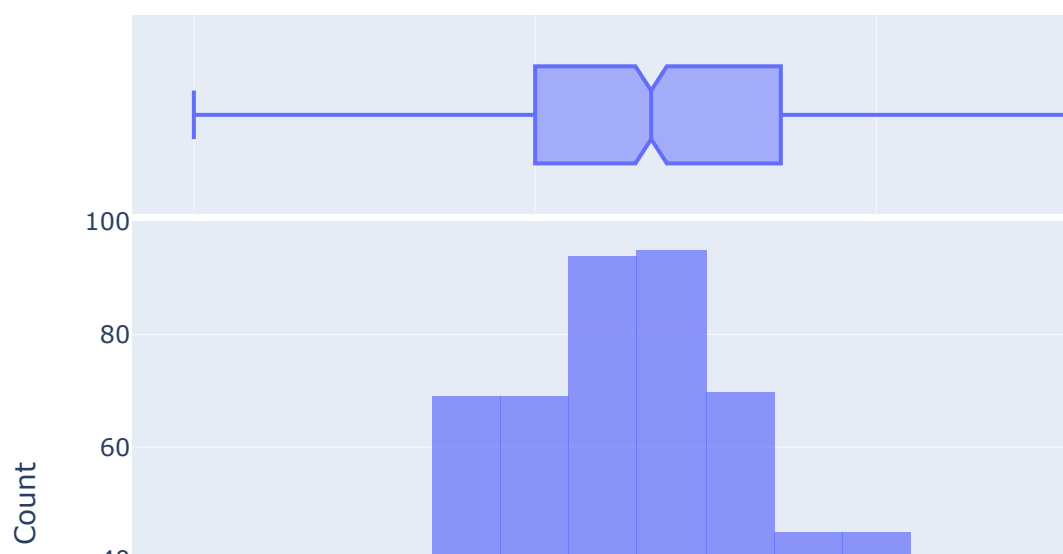
```
for i in df.columns:  
    if i != 'labels':  
        plt.figure(figsize=(15,6))  
        sns.violinplot(df[i], data = df, palette = 'hls')  
        plt.xticks(rotation = 90)  
        plt.show()
```



In [28]:

```
for i in df.columns:
    if i != 'labels':
        fig = px.histogram(df[i], nbins=20, color_discrete_sequence=['#636EFA'],
                           marginal='box', opacity=0.7)
        fig.update_layout(
            title=f'Histogram of {i}',
            xaxis_title=i,
            yaxis_title='Count',
            showlegend=False
        )
        fig.show()
```

Histogram of tempmax



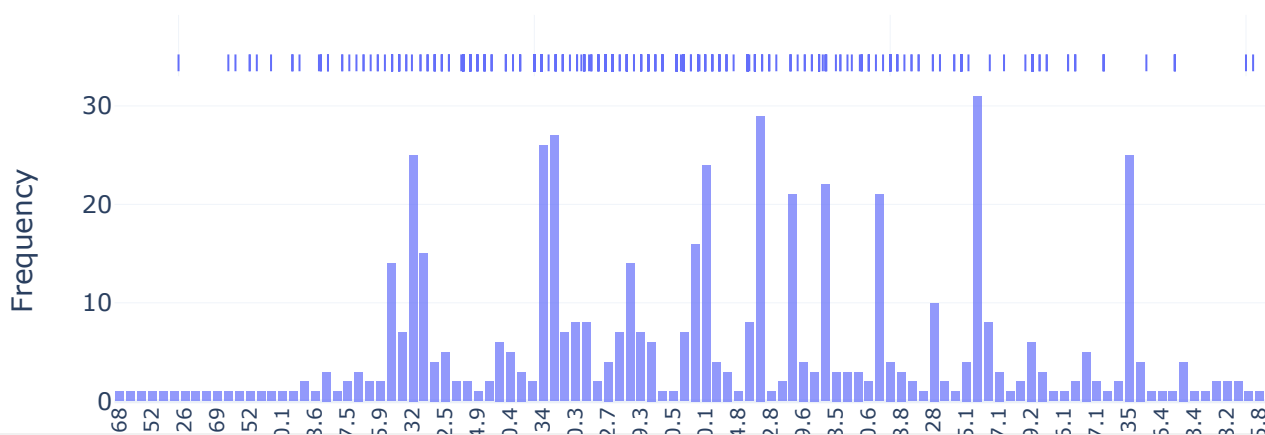
In [29]:

```

for i in df.columns:
    if i != 'labels':
        fig = px.histogram(df, x=i, color_discrete_sequence=['#636EFA'], nbins=20, opacity=0.8,
                           title=f'Histogram of {i}', labels={'x': i, 'count': 'Frequency'},
                           template='plotly_white', width=800, height=400,
                           marginal='rug', barmode='overlay',
                           hover_data=[df['labels']])
        fig.update_layout(xaxis=dict(type='category', title=i,
                                     tickangle=-90, tickfont=dict(size=10)),
                           yaxis_title='Frequency', showlegend=False)
        fig.show()

```

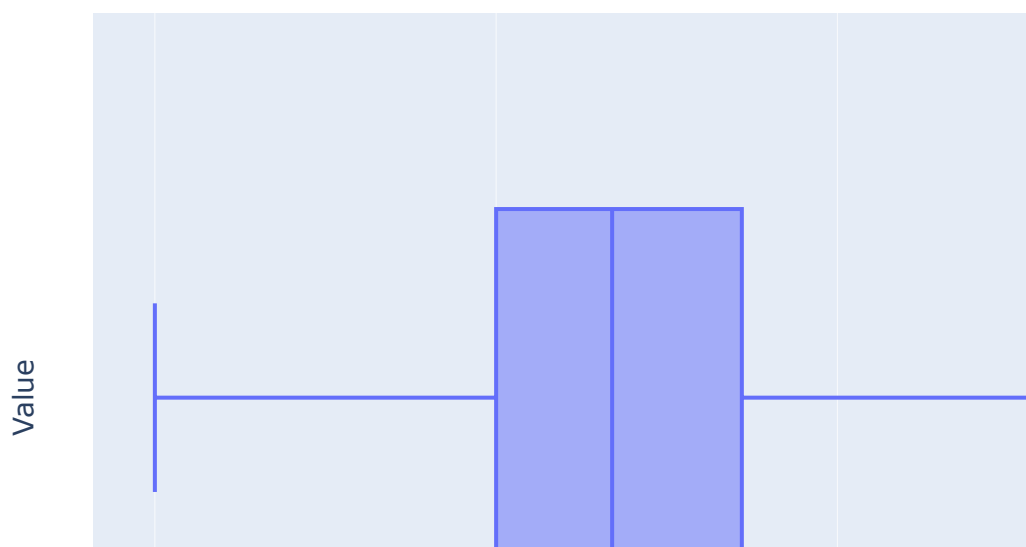
Histogram of tempmax



In [30]:

```
for i in df.columns:
    if i != 'labels':
        fig = px.box(df, x=df[i], color_discrete_sequence=['#636EFA'])
        fig.update_layout(
            title='Box Plot of ' + i,
            xaxis_title=i,
            yaxis_title='Value',
        )
        fig.show()
```

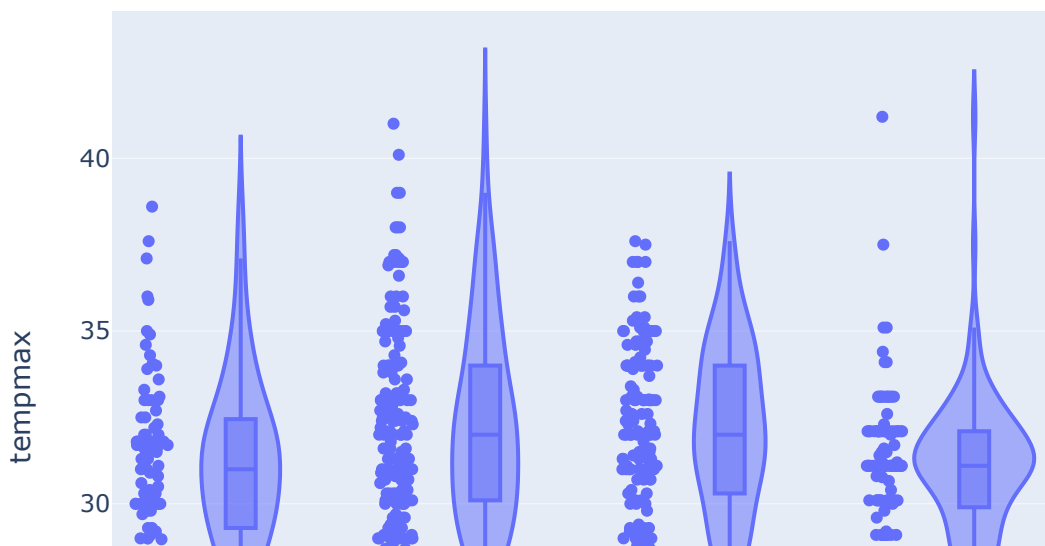
Box Plot of tempmax



In [31]:

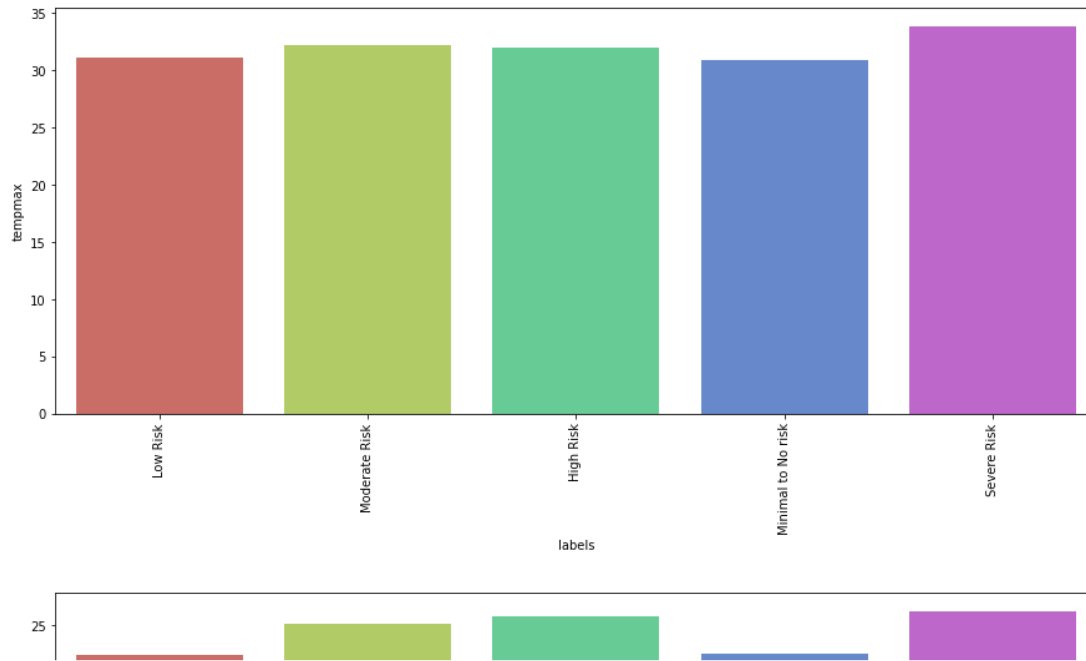
```
for i in df.columns:
    if i != 'labels':
        fig = px.violin(df, y=i, x='labels', box=True, points="all", hover_data=df.columns)
        fig.update_layout(title=i, xaxis_title="Labels", yaxis_title=i)
        fig.show()
```

tempmax



In [32]:

```
for i in df.columns:  
    if i != 'labels':  
        plt.figure(figsize=(15,6))  
        sns.barplot(x = df['labels'], y = df[i], data = df, ci = None, palette = 'hls')  
        plt.xticks(rotation = 90)  
        plt.show()
```



In [33]:

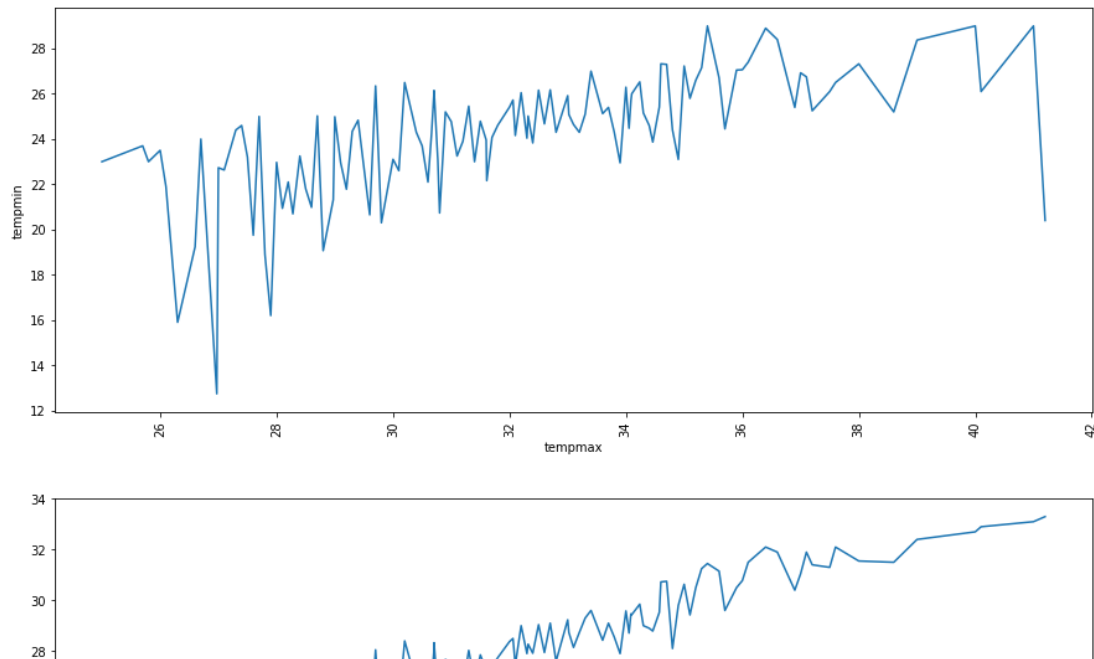
```
for i in df.columns:
    if i != 'labels':
        fig = px.bar(df, x="labels", y=i, color="labels", barmode="group")
        fig.update_layout(
            title=f"{i} by Labels",
            xaxis_title="Labels",
            yaxis_title=i,
            legend_title="Labels"
        )
        fig.show()
```

tempmax by Labels



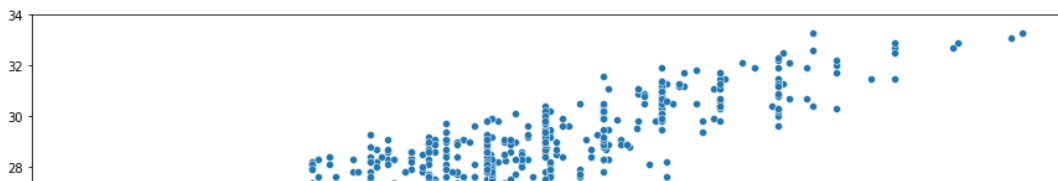
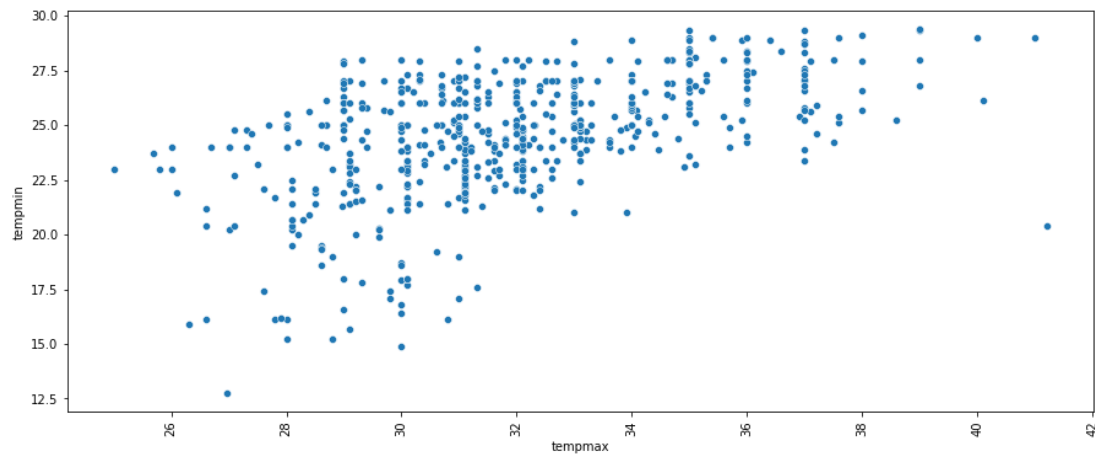
In [34]:

```
for i in df.columns:
    for j in df.columns:
        if i != j:
            if i != 'labels':
                plt.figure(figsize=(15,6))
                sns.lineplot(x = df[i], y = df[j], data = df, ci = None, palette = 'hls')
                plt.xticks(rotation = 90)
                plt.show()
```



In [35]:

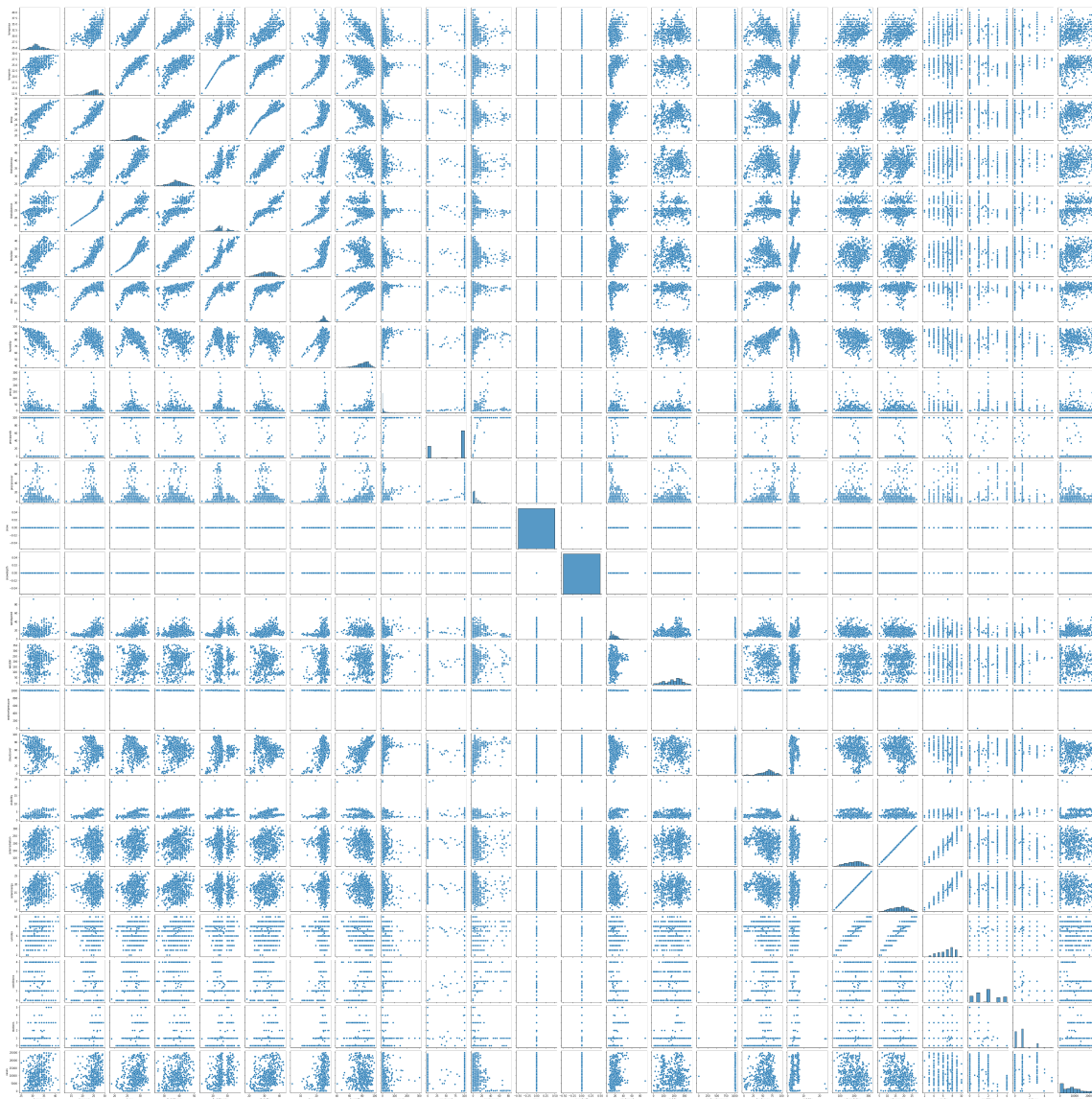
```
for i in df.columns:
    for j in df.columns:
        if i != j:
            if i != 'labels':
                plt.figure(figsize=(15,6))
                sns.scatterplot(x = df[i], y = df[j], data = df, ci = None, palette = 'h
                plt.xticks(rotation = 90)
                plt.show()
```



In [37]:

```
plt.figure(figsize=(15,6))  
sns.pairplot(data = df, palette = 'hls')  
plt.xticks(rotation = 90)  
plt.show()
```

<Figure size 1080x432 with 0 Axes>



In [38]:

```
df_corr = df.corr()
```

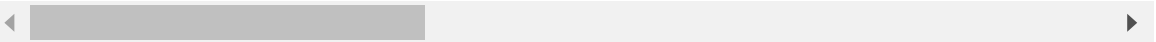
In [39]:

df_corr

Out[39]:

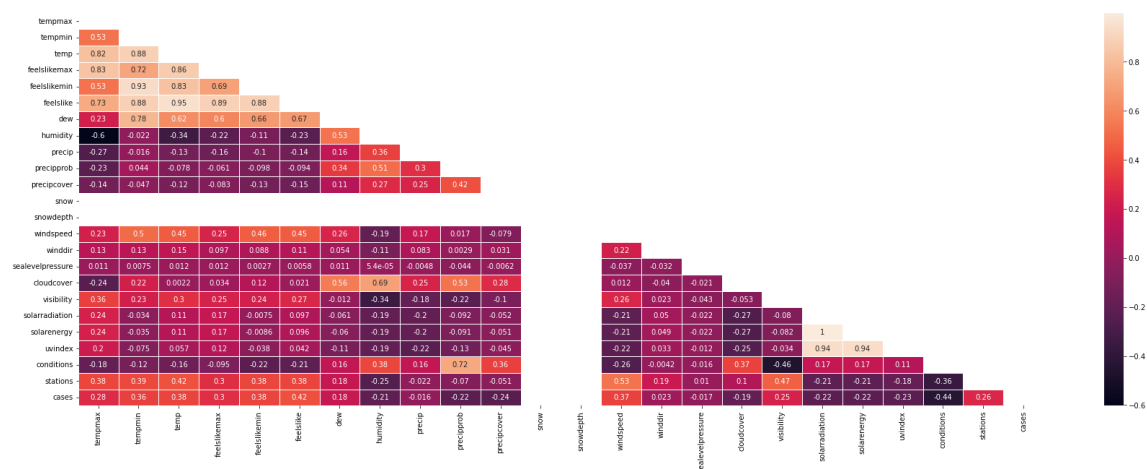
	tempmax	tempmin	temp	feelslikemax	feelslikemin	feelslike	humidity
tempmax	1.000000	0.527246	0.820941	0.832811	0.526838	0.732782	0.228436
tempmin	0.527246	1.000000	0.881988	0.716619	0.931412	0.883030	0.784664
temp	0.820941	0.881988	1.000000	0.863626	0.829122	0.949866	0.621103
feelslikemax	0.832811	0.716619	0.863626	1.000000	0.693604	0.891305	0.596466
feelslikemin	0.526838	0.931412	0.829122	0.693604	1.000000	0.883670	0.664503
feelslike	0.732782	0.883030	0.949866	0.891305	0.883670	1.000000	0.671107
dew	0.228436	0.784664	0.621103	0.596466	0.664503	0.671107	1.000000
humidity	-0.602729	-0.022102	-0.335037	-0.219550	-0.112346	-0.231987	0.525037
precip	-0.270202	-0.015915	-0.130827	-0.155520	-0.099895	-0.138739	0.155203
precipprob	-0.226290	0.043788	-0.077521	-0.061133	-0.097888	-0.093543	0.337521
precipcover	-0.139013	-0.047444	-0.118306	-0.083107	-0.131179	-0.150176	0.108306
snow	NaN	NaN	NaN	NaN	NaN	NaN	1.000000
snowdepth	NaN	NaN	NaN	NaN	NaN	NaN	1.000000
windspeed	0.234752	0.502966	0.451224	0.254755	0.460448	0.448998	0.255037
winddir	0.131311	0.130978	0.151874	0.096730	0.087622	0.114765	0.053037
sealevelpressure	0.011288	0.007517	0.011662	0.011925	0.002738	0.005758	0.010037
cloudcover	-0.237572	0.223664	0.002212	0.034238	0.115816	0.021153	0.557238
visibility	0.358248	0.225410	0.299479	0.245154	0.235159	0.273086	-0.012346
solarradiation	0.239410	-0.034087	0.114995	0.167350	-0.007501	0.096916	-0.060448
solarenergy	0.239365	-0.034765	0.114794	0.167075	-0.008587	0.096444	-0.060448
uvindex	0.198627	-0.075002	0.056545	0.115035	-0.038326	0.042182	-0.109037
conditions	-0.184010	-0.115677	-0.157189	-0.094710	-0.218707	-0.209585	0.159037
stations	0.381730	0.388823	0.421828	0.295325	0.382937	0.376258	0.175037
cases	0.284181	0.364691	0.378149	0.304087	0.376015	0.415344	0.179037

24 rows × 24 columns



In [41]:

```
plt.figure(figsize=(30, 10))
matrix = np.triu(df_corr)
sns.heatmap(df_corr, annot=True, linewidth=.8, mask=matrix, cmap="rocket");
plt.show()
```



In [44]:

```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
```

```
df['labels']=le.fit_transform(df['labels'])
X=df.iloc[:, :-1]
y=df['labels']
```

In [45]:

X

Out[45]:

	tempmax	tempmin	temp	feelslikemax	feelslikemin	feelslike	dew	hum
0	34.053151	24.478082	28.709863	39.757808	25.317808	32.306301	22.971233	73.50
1	34.086179	25.694309	29.464228	41.338211	28.140650	34.423577	23.484553	72.06
2	34.573984	25.417886	29.526829	40.464228	26.560163	33.085366	22.580488	69.42
3	33.020325	25.080488	28.727642	37.878049	26.193496	31.772358	21.752033	69.29
4	30.660976	24.230894	26.774797	36.586992	24.263415	28.943902	24.214634	86.65
...
597	32.300000	24.400000	28.500000	35.900000	24.400000	31.200000	23.300000	75.00
598	32.700000	26.400000	29.300000	36.300000	26.400000	32.500000	22.600000	68.50
599	33.000000	26.300000	29.800000	40.500000	26.300000	34.500000	23.900000	71.10
600	35.100000	26.800000	30.600000	42.900000	29.100000	35.100000	23.300000	65.90
601	34.000000	26.300000	30.200000	38.100000	26.300000	33.100000	21.500000	60.40

602 rows × 24 columns

In [46]:

```
from sklearn.model_selection import train_test_split
```

In [47]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, stratify = df['random_state=42])
```

In [48]:

```
from sklearn.ensemble import RandomForestRegressor
```

In [49]:

```
reg=RandomForestRegressor()  
reg.fit(X_train,y_train)
```

Out[49]:

▼ RandomForestRegressor

RandomForestRegressor()

In [50]:

```
y_pred=reg.predict(X_test)
```

In [53]:

```
reg.score(X_test,y_test)
```

Out[53]:

0.9943796068075117

In [54]:

```
from sklearn.model_selection import cross_val_score  
acc=cross_val_score(reg,X_test,y_test,cv=5).mean()  
print(acc)
```

0.9404900487112752