# India's Weather Analysis

# import Library

In [2]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
from datetime import datetime
import warnings
warnings.filterwarnings('ignore')
```

# Reading the data

In [3]:
```
df=pd.read_csv(r'C:\Users\admin\Downloads\Weather Data in India from 1901 to
df
```

Out[3]:

| | Unnamed: 0 | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 1901 | 17.99 | 19.43 | 23.49 | 26.41 | 28.28 | 28.60 | 27.49 | 26.98 | 26.26 | 25.08 | 21.73 |
| **1** | 1 | 1902 | 19.00 | 20.39 | 24.10 | 26.54 | 28.68 | 28.44 | 27.29 | 27.05 | 25.95 | 24.37 | 21.33 |
| **2** | 2 | 1903 | 18.32 | 19.79 | 22.46 | 26.03 | 27.93 | 28.41 | 28.04 | 26.63 | 26.34 | 24.57 | 20.96 |
| **3** | 3 | 1904 | 17.77 | 19.39 | 22.95 | 26.73 | 27.83 | 27.85 | 26.84 | 26.73 | 25.84 | 24.36 | 21.07 |
| **4** | 4 | 1905 | 17.40 | 17.79 | 21.78 | 24.84 | 28.32 | 28.69 | 27.67 | 27.47 | 26.29 | 26.16 | 22.07 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **112** | 112 | 2013 | 18.88 | 21.07 | 24.53 | 26.97 | 29.06 | 28.24 | 27.50 | 27.22 | 26.87 | 25.63 | 22.18 |
| **113** | 113 | 2014 | 18.81 | 20.35 | 23.34 | 26.91 | 28.45 | 29.42 | 28.07 | 27.42 | 26.61 | 25.38 | 22.53 |
| **114** | 114 | 2015 | 19.02 | 21.23 | 23.52 | 26.52 | 28.82 | 28.15 | 28.03 | 27.64 | 27.04 | 25.82 | 22.95 |
| **115** | 115 | 2016 | 20.92 | 23.58 | 26.61 | 29.56 | 30.41 | 29.70 | 28.18 | 28.17 | 27.72 | 26.81 | 23.90 |
| **116** | 116 | 2017 | 20.59 | 23.08 | 25.58 | 29.17 | 30.47 | 29.44 | 28.31 | 28.12 | 28.11 | 27.24 | 23.92 |

117 rows × 14 columns

# Data Cleaning

# drop the data

In [4]:
```
df=df.drop(columns=['Unnamed: 0'])
df
```

Out[4]:

| | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1901 | 17.99 | 19.43 | 23.49 | 26.41 | 28.28 | 28.60 | 27.49 | 26.98 | 26.26 | 25.08 | 21.73 | 18.95 |
| **1** | 1902 | 19.00 | 20.39 | 24.10 | 26.54 | 28.68 | 28.44 | 27.29 | 27.05 | 25.95 | 24.37 | 21.33 | 18.78 |
| **2** | 1903 | 18.32 | 19.79 | 22.46 | 26.03 | 27.93 | 28.41 | 28.04 | 26.63 | 26.34 | 24.57 | 20.96 | 18.29 |
| **3** | 1904 | 17.77 | 19.39 | 22.95 | 26.73 | 27.83 | 27.85 | 26.84 | 26.73 | 25.84 | 24.36 | 21.07 | 18.84 |
| **4** | 1905 | 17.40 | 17.79 | 21.78 | 24.84 | 28.32 | 28.69 | 27.67 | 27.47 | 26.29 | 26.16 | 22.07 | 18.71 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **112** | 2013 | 18.88 | 21.07 | 24.53 | 26.97 | 29.06 | 28.24 | 27.50 | 27.22 | 26.87 | 25.63 | 22.18 | 19.69 |
| **113** | 2014 | 18.81 | 20.35 | 23.34 | 26.91 | 28.45 | 29.42 | 28.07 | 27.42 | 26.61 | 25.38 | 22.53 | 19.50 |
| **114** | 2015 | 19.02 | 21.23 | 23.52 | 26.52 | 28.82 | 28.15 | 28.03 | 27.64 | 27.04 | 25.82 | 22.95 | 20.21 |
| **115** | 2016 | 20.92 | 23.58 | 26.61 | 29.56 | 30.41 | 29.70 | 28.18 | 28.17 | 27.72 | 26.81 | 23.90 | 21.89 |
| **116** | 2017 | 20.59 | 23.08 | 25.58 | 29.17 | 30.47 | 29.44 | 28.31 | 28.12 | 28.11 | 27.24 | 23.92 | 21.47 |

117 rows × 13 columns

# To view all the data

In [5]:
```
df
```

Out[5]:

| | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1901 | 17.99 | 19.43 | 23.49 | 26.41 | 28.28 | 28.60 | 27.49 | 26.98 | 26.26 | 25.08 | 21.73 | 18.95 |
| **1** | 1902 | 19.00 | 20.39 | 24.10 | 26.54 | 28.68 | 28.44 | 27.29 | 27.05 | 25.95 | 24.37 | 21.33 | 18.78 |
| **2** | 1903 | 18.32 | 19.79 | 22.46 | 26.03 | 27.93 | 28.41 | 28.04 | 26.63 | 26.34 | 24.57 | 20.96 | 18.29 |
| **3** | 1904 | 17.77 | 19.39 | 22.95 | 26.73 | 27.83 | 27.85 | 26.84 | 26.73 | 25.84 | 24.36 | 21.07 | 18.84 |
| **4** | 1905 | 17.40 | 17.79 | 21.78 | 24.84 | 28.32 | 28.69 | 27.67 | 27.47 | 26.29 | 26.16 | 22.07 | 18.71 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **112** | 2013 | 18.88 | 21.07 | 24.53 | 26.97 | 29.06 | 28.24 | 27.50 | 27.22 | 26.87 | 25.63 | 22.18 | 19.69 |
| **113** | 2014 | 18.81 | 20.35 | 23.34 | 26.91 | 28.45 | 29.42 | 28.07 | 27.42 | 26.61 | 25.38 | 22.53 | 19.50 |
| **114** | 2015 | 19.02 | 21.23 | 23.52 | 26.52 | 28.82 | 28.15 | 28.03 | 27.64 | 27.04 | 25.82 | 22.95 | 20.21 |
| **115** | 2016 | 20.92 | 23.58 | 26.61 | 29.56 | 30.41 | 29.70 | 28.18 | 28.17 | 27.72 | 26.81 | 23.90 | 21.89 |
| **116** | 2017 | 20.59 | 23.08 | 25.58 | 29.17 | 30.47 | 29.44 | 28.31 | 28.12 | 28.11 | 27.24 | 23.92 | 21.47 |

117 rows × 13 columns

# First let's create another dataframe to make the

# data easier to visualize. We are going to organize the data into a time series.

In [6]:
```
dates = {}

i = 0
for y in df['YEAR']:
    for m in df.columns[1:]:

        dat = str(m) + '/' + str(y)
        dates[dat] = df[m][i]
    i += 1

dates = pd.DataFrame(pd.Series(dates).reset_index())
dates.columns = ['date', 'temp']

dates['date'] = pd.to_datetime(dates['date'], format= '%b/%Y')
dates['year'] = dates['date'].dt.year
dates['month'] = dates['date'].dt.month_name()

dates.head()
```

Out[6]:

| | date | temp | year | month |
|---|---|---|---|---|
| **0** | 1901-01-01 | 17.99 | 1901 | January |
| **1** | 1901-02-01 | 19.43 | 1901 | February |
| **2** | 1901-03-01 | 23.49 | 1901 | March |
| **3** | 1901-04-01 | 26.41 | 1901 | April |
| **4** | 1901-05-01 | 28.28 | 1901 | May |

# Check the datatype of the dataset

In [7]:
```
dates.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1404 entries, 0 to 1403
Data columns (total 4 columns):
 #   Column  Non-Null Count  Dtype         
---  ------  --------------  -----         
 0   date    1404 non-null   datetime64[ns]
 1   temp    1404 non-null   float64       
 2   year    1404 non-null   int64         
 3   month   1404 non-null   object        
dtypes: datetime64[ns](1), float64(1), int64(1), object(1)
memory usage: 44.0+ KB
```

# To check the missing values

In [8]:
```
1 dates.isnull().sum()
```

Out[8]:
```
date     0
temp     0
year     0
month    0
dtype: int64
```

# Top 5 records

In [9]:
```
1 data=dates.head(5)
2 data
```

Out[9]:

| | date | temp | year | month |
|---|---|---|---|---|
| **0** | 1901-01-01 | 17.99 | 1901 | January |
| **1** | 1901-02-01 | 19.43 | 1901 | February |
| **2** | 1901-03-01 | 23.49 | 1901 | March |
| **3** | 1901-04-01 | 26.41 | 1901 | April |
| **4** | 1901-05-01 | 28.28 | 1901 | May |

# Top 5 bottom report

In [10]:
```
1 dates.tail(5)
```

Out[10]:

| | date | temp | year | month |
|---|---|---|---|---|
| **1399** | 2017-08-01 | 28.12 | 2017 | August |
| **1400** | 2017-09-01 | 28.11 | 2017 | September |
| **1401** | 2017-10-01 | 27.24 | 2017 | October |
| **1402** | 2017-11-01 | 23.92 | 2017 | November |
| **1403** | 2017-12-01 | 21.47 | 2017 | December |

# To print field name

In [11]:
```
1 dates.columns
```

Out[11]:
```
Index(['date', 'temp', 'year', 'month'], dtype='object')
```

# print information of a dataset dates

# To print the Statistical information

In [14]:
```
1 dates.describe(include='all')
```

Out[14]:

| | date | temp | year | month |
|---|---|---|---|---|
| **count** | 1404 | 1404.000000 | 1404.000000 | 1404 |
| **unique** | 1404 | NaN | NaN | 12 |
| **top** | 1918-10-01 00:00:00 | NaN | NaN | April |
| **freq** | 1 | NaN | NaN | 117 |
| **first** | 1901-01-01 00:00:00 | NaN | NaN | NaN |
| **last** | 2017-12-01 00:00:00 | NaN | NaN | NaN |
| **mean** | NaN | 24.294160 | 1959.000000 | NaN |
| **std** | NaN | 3.516446 | 33.785791 | NaN |
| **min** | NaN | 17.250000 | 1901.000000 | NaN |
| **25%** | NaN | 21.067500 | 1930.000000 | NaN |
| **50%** | NaN | 25.570000 | 1959.000000 | NaN |
| **75%** | NaN | 27.240000 | 1988.000000 | NaN |
| **max** | NaN | 30.780000 | 2017.000000 | NaN |

# To check is there any duplicate value

In [15]:
```
1 dates.duplicated().sum()
```

Out[15]:
```
0
```

# To Count number of categories

In [16]:
```
1 dates['month'].value_counts()
```

Out[16]:
```
April        117
November     117
October      117
March        117
September    117
May          117
January      117
August       117
July         117
June         117
February     117
December     117
Name: month, dtype: int64
```

# rename the columns

In [17]:
```
dates.rename(columns={'date':'Date','temp':'Temp','year':'Year','month':'mon
```

In [18]:
```
dates
```

Out[18]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **0** | 1901-01-01 | 17.99 | 1901 | January |
| **1** | 1901-02-01 | 19.43 | 1901 | February |
| **2** | 1901-03-01 | 23.49 | 1901 | March |
| **3** | 1901-04-01 | 26.41 | 1901 | April |
| **4** | 1901-05-01 | 28.28 | 1901 | May |
| **...** | ... | ... | ... | ... |
| **1399** | 2017-08-01 | 28.12 | 2017 | August |
| **1400** | 2017-09-01 | 28.11 | 2017 | September |
| **1401** | 2017-10-01 | 27.24 | 2017 | October |
| **1402** | 2017-11-01 | 23.92 | 2017 | November |
| **1403** | 2017-12-01 | 21.47 | 2017 | December |

1404 rows × 4 columns

# max Temprature

In [19]:
```
d5=dates.Temp.max()
d5
```

Out[19]:
```
30.78
```

# min Temprature

In [20]:
```
dates.Temp.min()
```

Out[20]:
```
17.25
```

# To check the unique Temprature

In [21]:
```
1 dates.Temp.unique()
```

Out[21]:
```
array([17.99, 19.43, 23.49, 26.41, 28.28, 28.6 , 27.49, 26.98, 26.26,
       25.08, 21.73, 18.95, 19.  , 20.39, 24.1 , 26.54, 28.68, 28.44,
       27.29, 27.05, 25.95, 24.37, 21.33, 18.78, 18.32, 19.79, 22.46,
       26.03, 27.93, 28.41, 28.04, 26.63, 26.34, 24.57, 20.96, 18.29,
       17.77, 19.39, 22.95, 26.73, 27.83, 27.85, 26.84, 25.84, 24.36,
       21.07, 18.84, 17.4 , 17.79, 21.78, 24.84, 28.32, 28.69, 27.67,
       27.47, 26.29, 26.16, 22.07, 18.71, 17.5 , 19.14, 22.21, 26.53,
       29.06, 28.02, 27.46, 26.82, 26.23, 24.75, 21.93, 19.55, 19.27,
       19.42, 22.03, 27.52, 27.66, 27.28, 26.38, 24.72, 22.11, 18.46,
       18.35, 19.73, 22.93, 27.06, 28.07, 28.49, 27.16, 25.74, 24.25,
       21.06, 18.15, 19.05, 23.4 , 25.76, 27.97, 26.56, 26.43, 25.47,
       22.01, 18.86, 18.14, 19.72, 22.9 , 25.96, 28.36, 27.72, 26.93,
       26.61, 25.98, 24.04, 20.72, 18.05, 18.52, 19.18, 22.05, 26.  ,
       28.55, 27.44, 27.04, 26.22, 21.1 , 18.76, 18.6 , 20.84, 26.21,
       28.3 , 28.53, 26.68, 25.81, 24.44, 21.  , 18.44, 18.2 , 19.98,
       22.15, 27.95, 27.91, 27.  , 26.8 , 26.02, 24.35, 20.92, 18.7 ,
       18.96, 19.66, 22.63, 25.73, 28.24, 28.46, 26.49, 23.97, 21.87,
       18.73, 17.93, 22.69, 29.17, 28.58, 27.77, 27.32, 25.46, 22.18,
       18.31, 19.68, 24.24, 28.16, 27.81, 27.08, 26.77, 24.6 , 21.03,
       18.17, 18.16, 19.94, 25.29, 26.97, 27.41, 27.15, 26.64, 25.79,
       23.85, 20.8 , 18.39, 17.25, 19.58, 22.64, 25.26, 28.27, 27.58,
       27.74, 24.54, 21.71, 18.37, 19.15, 23.15, 26.19, 28.2 , 21.48,
       18.58, 18.27, 19.16, 23.02, 27.76, 27.48, 24.85, 21.84, 18.61,
       22.12, 24.26, 27.11, 30.78, 27.4 , 26.59, 25.92, 23.84, 19.24,
       18.3 , 20.5 , 23.65, 26.55, 29.8 , 28.03, 27.26, 26.95, 26.04,
       23.94, 21.28, 18.23, 19.35, 23.21, 26.81, 28.33, 28.95, 26.89,
       26.71, 25.89, 23.89, 21.23, 19.08, 18.06, 19.97, 24.12, 26.87,
       27.43, 27.5 , 26.91, 25.72, 24.5 , 21.04, 18.97, 17.53, 23.5 ,
       27.24, 27.82, 27.01, 24.61, 21.29, 18.63, 18.65, 20.7 , 22.87,
       25.3 , 27.69, 28.97, 27.65, 24.41, 20.59, 18.8 , 19.4 , 22.71,
       26.13, 27.7 , 27.23, 26.66, 26.1 , 24.7 , 21.16, 19.41, 18.66,
       20.13, 23.23, 26.44, 28.88, 28.22, 26.9 , 26.32, 24.92, 21.77,
       18.25, 24.05, 17.75, 18.72, 23.36, 25.94, 28.11, 27.84, 27.31,
       26.85, 26.17, 21.41, 19.11, 19.34, 23.31, 27.27, 28.51, 26.25,
       24.91, 21.7 , 19.29, 19.51, 23.39, 28.52, 26.5 , 24.69, 17.84,
       20.33, 23.22, 25.52, 27.92, 27.39, 25.86, 21.67, 19.31, 17.8 ,
       20.51, 22.97, 26.58, 28.13, 27.42, 26.74, 24.42, 21.15, 17.54,
       25.15, 28.45, 27.18, 26.37, 25.85, 21.49, 19.03, 20.  , 22.84,
       26.27, 27.12, 24.73, 21.72, 19.13, 18.02, 20.21, 22.6 , 25.83,
       28.4 , 23.98, 21.34, 18.09, 18.77, 23.61, 27.33, 26.83, 26.14,
       20.62, 18.9 , 18.4 , 21.98, 25.67, 28.63, 27.22, 26.92, 26.4 ,
       24.66, 21.32, 18.1 , 19.88, 22.23, 25.88, 28.38, 28.29, 24.74,
       18.33, 20.28, 28.89, 27.54, 21.76, 19.67, 18.07, 20.06, 23.87,
       26.79, 28.82, 28.81, 26.62, 24.56, 21.85, 18.75, 19.47, 25.56,
       27.8 , 24.2 , 21.81, 19.02, 18.  , 19.07, 22.54, 25.63, 28.93,
       28.39, 26.08, 24.49, 21.51, 19.32, 17.33, 19.37, 23.28, 28.31,
       26.51, 17.98, 20.73, 26.86, 28.48, 28.14, 26.31, 24.98, 21.6 ,
       20.08, 17.72, 19.84, 23.55, 26.88, 26.28, 24.67, 19.36, 22.72,
       28.71, 26.72, 21.58, 18.79, 19.01, 23.37, 28.35, 27.86, 20.79,
       18.36, 22.45, 28.34, 28.21, 27.03, 25.6 , 24.07, 19.09, 23.13,
       25.19, 27.2 , 27.09, 22.34, 19.3 , 18.67, 21.05, 22.73, 26.96,
       27.37, 26.48, 18.11, 20.86, 24.9 , 28.99, 28.79, 27.35, 26.24,
       19.85, 20.45, 23.66, 26.99, 28.84, 23.52, 20.99, 18.94, 18.42,
       23.93, 25.5 , 28.01, 27.07, 24.22, 21.14, 18.69, 18.01, 23.44,
       28.72, 22.31, 25.68, 26.75, 19.6 , 19.5 , 29.01, 27.6 , 19.65,
```

```
28.47, 21.57, 19.44, 21.13, 22.65, 28.5 , 26.33, 24.58, 21.35,
19.59, 18.89, 26.42, 26.45, 24.23, 20.98, 28.25, 27.53, 21.38,
17.59, 20.55, 25.69, 27.71, 21.99, 19.23, 17.71, 19.95, 28.06,
25.99, 24.8 , 18.47, 19.96, 22.81, 25.35, 27.57, 27.14, 24.99,
22.16, 21.17, 23.51, 27.02, 24.51, 27.36, 26.7 , 26.35, 21.4 ,
17.52, 18.98, 23.18, 24.32, 21.56, 19.2 , 20.3 , 24.52, 24.89,
22.29, 27.17, 27.25, 24.81, 18.12, 19.99, 23.29, 24.39, 21.21,
23.43, 28.08, 28.7 , 26.76, 24.27, 21.91, 19.46, 18.51, 23.33,
28.62, 24.43, 21.46, 19.28, 23.91, 27.89, 24.65, 21.31, 22.78,
26.39, 26.47, 20.76, 19.54, 22.98, 27.94, 27.34, 22.47, 20.34,
24.45, 24.86, 22.7 , 19.76, 28.92, 28.42, 24.94, 19.53, 22.75,
28.83, 25.23, 18.81, 20.47, 23.24, 27.55, 28.94, 25.12, 20.44,
23.26, 26.65, 26.36, 21.43, 18.87, 19.52, 22.37, 26.15, 27.68,
19.33, 18.38, 19.81, 22.68, 27.51, 21.5 , 18.28, 28.43, 26.94,
21.47, 20.54, 28.05, 24.33, 18.24, 23.53, 27.75, 28.19, 27.3 ,
24.48, 21.89, 19.38, 20.41, 23.45, 28.9 , 27.13, 25.03, 22.14,
19.75, 20.83, 26.6 , 28.37, 24.79, 21.63, 19.64, 17.68, 23.  ,
21.8 , 18.56, 22.79, 22.08, 19.78, 20.43, 23.58, 28.17, 27.59,
19.77, 26.78, 26.11, 28.73, 24.88, 22.2 , 20.2 , 24.14, 28.56,
22.06, 29.34, 29.88, 22.99, 20.65, 25.13, 26.67, 17.86, 23.64,
25.55, 20.6 , 29.18, 27.78, 25.27, 22.48, 19.21, 21.26, 24.18,
24.97, 22.33, 19.57, 25.58, 18.5 , 29.46, 27.63, 27.62, 25.49,
22.51, 20.52, 29.56, 28.77, 25.44, 23.17, 19.87, 23.62, 28.64,
22.17, 18.83, 27.38, 28.12, 24.34, 22.43, 19.93, 25.41, 22.59,
20.97, 22.4 , 18.49, 19.83, 28.1 , 21.66, 24.55, 25.2 , 20.22,
29.19, 19.22, 24.11, 25.51, 28.91, 27.98, 22.26, 19.91, 18.88,
24.53, 19.69, 20.35, 23.34, 29.42, 25.38, 22.53, 26.52, 28.15,
27.64, 25.82, 30.41, 29.7 , 28.18, 23.9 , 23.08, 30.47, 29.44,
23.92])
```

# Sort the dataset

In [22]:
```
1 sort=dates.sort_values('Temp',ascending=True).head(5)
2 sort
```

Out[22]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **204** | 1918-01-01 | 17.25 | 1918 | January |
| **528** | 1945-01-01 | 17.33 | 1945 | January |
| **48** | 1905-01-01 | 17.40 | 1905 | January |
| **60** | 1906-01-01 | 17.50 | 1906 | January |
| **804** | 1968-01-01 | 17.52 | 1968 | January |

In [23]:
```
1 dates.sort_values('Temp',ascending=False).head(5)
```

Out[23]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **244** | 1921-05-01 | 30.78 | 1921 | May |
| **1396** | 2017-05-01 | 30.47 | 2017 | May |
| **1384** | 2016-05-01 | 30.41 | 2016 | May |
| **1133** | 1995-06-01 | 29.88 | 1995 | June |
| **256** | 1922-05-01 | 29.80 | 1922 | May |

In [24]:
```
1 pd.crosstab(dates['months'],dates['Temp'])
```

Out[24]:

| Temp | 17.25 | 17.33 | 17.40 | 17.50 | 17.52 | 17.53 | 17.54 | 17.59 | 17.68 | 17.71 | ... | 29.42 | 29.44 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **months** | | | | | | | | | | | | | |
| **April** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **August** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **December** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **February** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **January** | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | ... | 0 | 0 |
| **July** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **June** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 1 | 1 |
| **March** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **May** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **November** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **October** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |
| **September** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 |

12 rows × 748 columns

# min temprature in january

In [25]:
```
df=dates[dates['months']=='January']
df.head(10)
d2=df.sort_values('months',ascending=True)
d2
```

Out[25]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **0** | 1901-01-01 | 17.99 | 1901 | January |
| **1008** | 1985-01-01 | 18.67 | 1985 | January |
| **996** | 1984-01-01 | 18.28 | 1984 | January |
| **984** | 1983-01-01 | 18.38 | 1983 | January |
| **972** | 1982-01-01 | 18.76 | 1982 | January |
| **...** | ... | ... | ... | ... |
| **384** | 1933-01-01 | 17.84 | 1933 | January |
| **372** | 1932-01-01 | 18.72 | 1932 | January |
| **360** | 1931-01-01 | 19.34 | 1931 | January |
| **504** | 1943-01-01 | 18.32 | 1943 | January |
| **1392** | 2017-01-01 | 20.59 | 2017 | January |

117 rows × 4 columns

# Group by months and aggregate Temperature

In [26]:
```
d4=dates.groupby("months").Temp.sum().sort_values(ascending=False)
d4.head(5)
```

Out[26]:
```
months
May       3321.21
June      3311.21
July      3202.20
August    3151.99
April     3102.15
Name: Temp, dtype: float64
```

# Temperature grater than 30

In [27]:
```
High_Temp=dates.loc[dates['Temp']>30]
High_Temp
```

Out[27]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **244** | 1921-05-01 | 30.78 | 1921 | May |
| **1384** | 2016-05-01 | 30.41 | 2016 | May |
| **1396** | 2017-05-01 | 30.47 | 2017 | May |

# Temperature less than 20

In [28]:
```
Low_Temp=dates.loc[dates['Temp']<20]
Low_Temp
```

Out[28]:

| | Date | Temp | Year | months |
|---|---|---|---|---|
| **0** | 1901-01-01 | 17.99 | 1901 | January |
| **1** | 1901-02-01 | 19.43 | 1901 | February |
| **11** | 1901-12-01 | 18.95 | 1901 | December |
| **12** | 1902-01-01 | 19.00 | 1902 | January |
| **23** | 1902-12-01 | 18.78 | 1902 | December |
| **...** | ... | ... | ... | ... |
| **1344** | 2013-01-01 | 18.88 | 2013 | January |
| **1355** | 2013-12-01 | 19.69 | 2013 | December |
| **1356** | 2014-01-01 | 18.81 | 2014 | January |
| **1367** | 2014-12-01 | 19.50 | 2014 | December |
| **1368** | 2015-01-01 | 19.02 | 2015 | January |

284 rows × 4 columns

In [29]:
```
#loc is rows and colmuns
#iloc: indexing the row and colu
```

# copy

In [30]:
```
d1=dates.copy()
d1=d1.pivot_table('Temp',columns='months',aggfunc='sum')
d1
```

Out[30]:

| months | April | August | December | February | January | July | June | March | May | Novemb |
|---|---|---|---|---|---|---|---|---|---|---|
| **Temp** | 3102.15 | 3151.99 | 2243.28 | 2356.14 | 2155.52 | 3202.2 | 3311.21 | 2741.8 | 3321.21 | 2546 |

In [31]:
```
d2=dates.copy()
d2=d2.pivot_table('Temp',columns='months',aggfunc='min')
d2
```

Out[31]:

| months | April | August | December | February | January | July | June | March | May | November | Oct |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Temp | 24.84 | 26.21 | 17.98 | 17.79 | 17.25 | 26.48 | 27.33 | 21.78 | 26.97 | 20.59 | |

In [32]:
```
d2=dates.copy()
d2=d2.pivot_table('Temp',columns='months',aggfunc='max')
d2
```

Out[32]:

| months | April | August | December | February | January | July | June | March | May | November | Oct |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Temp | 29.56 | 28.17 | 21.89 | 23.58 | 20.92 | 28.47 | 29.88 | 26.61 | 30.78 | 23.92 | |

# Conclusion:-

# * I'm read the data in the variable df and then for visualising the data more clear I have convert the India weather data into time series data. And then I read my data into the variable dates and drop the unused column(unnamed) and apart from that I rename the columns of data as 'date':'Date','temp':'Temp','year':'Year','month':'mo

# * There is not any null value shown in the datset.

# * The name of the field available in the dataset are date','temp','year','month

# * The datatype of the fields are date: datetime,temp:float,year: int,and month: object

# * There are 141 value counts and unique values in Dates field are available, 141 value counts are available for the Temperature.

*** Hence by analysing the data of weather of India between the time period 1901-2017. We say that the highest Temp was 30.78 degree C in the year 1921 in the month may. And the lowest Temp. in India was 17.98 in the year January,1918.**

*** Apart from that, After the grouping months with aggregate temperature, we analysed that the Top hot month are may which is showing the highest aggregate temperature which is 3321.21, the second hot month is June: 3311.21, and third top hoest month is July: 3202.20**

*** After loc the dates columns with the temperature we are cheking the temp. greater than 30, So the output showing that may is the only month in which the temperature is more than 30. And the months in which temp lowers than 20 are the some winter months namely January, December, and February**

*** I'm copying the data into the another variable d1 and cso sove pivot table analysis of the categorical variable namely months and the numeric variable Temp and check the aggfunc by max and min function**

## Data Visualization

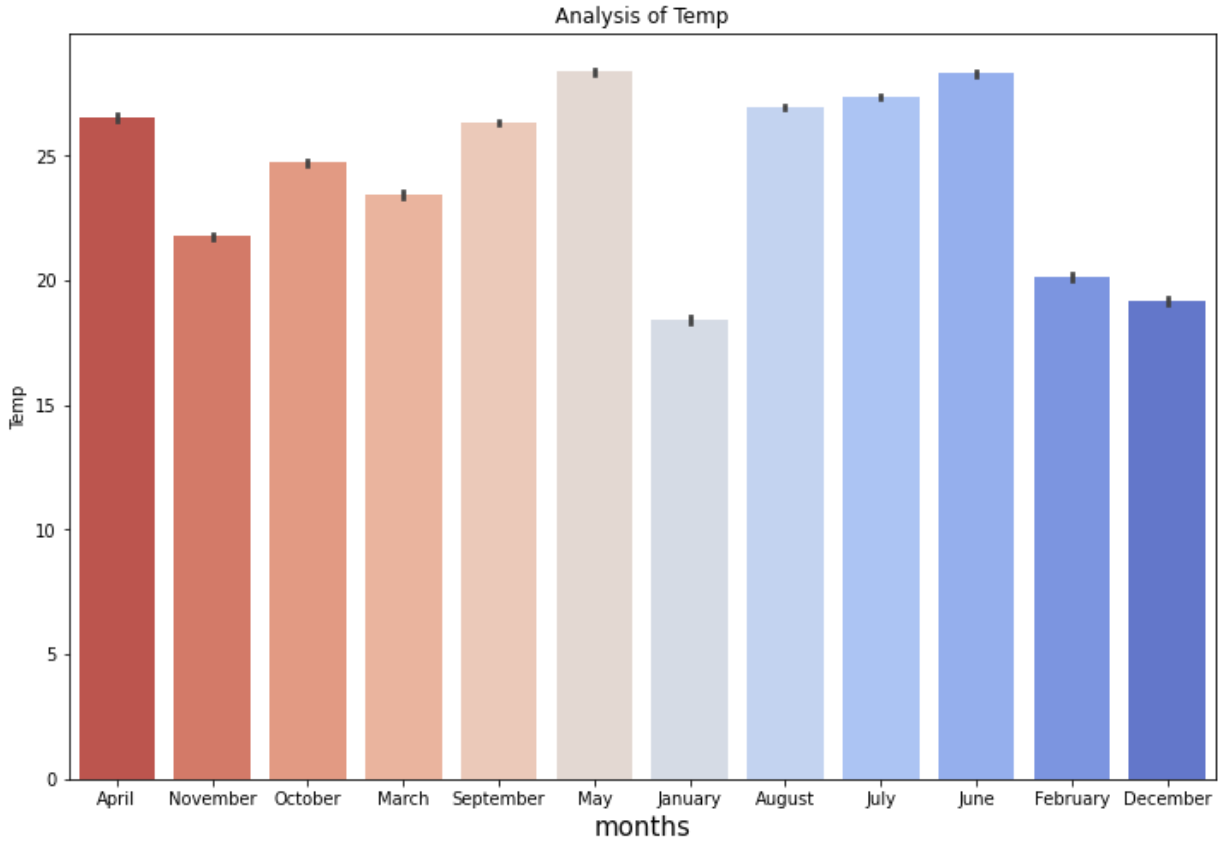
In [33]:
```
1 import seaborn as sns
```

## Bar Plot

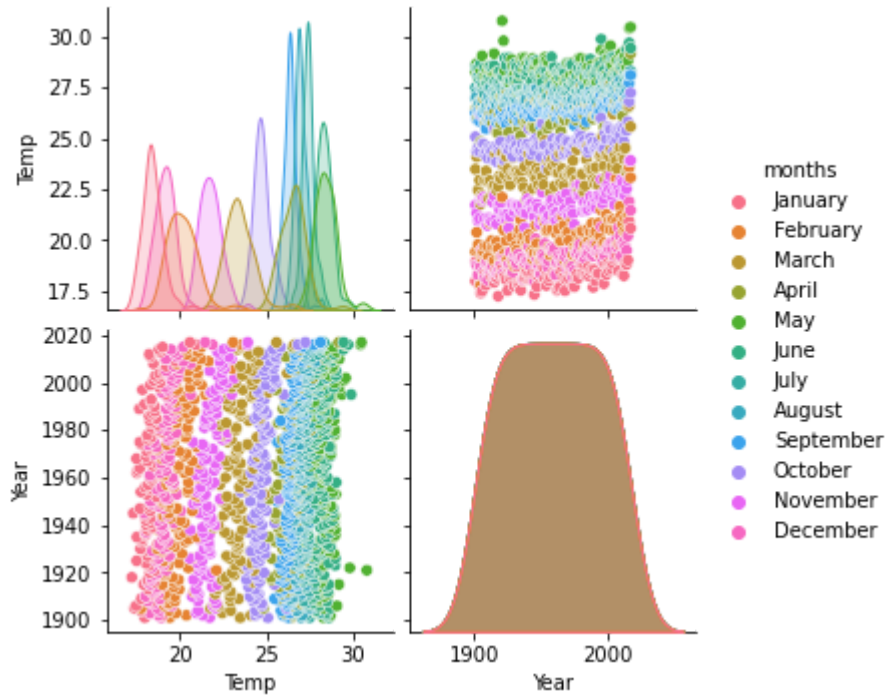
In [34]:

```
plt.figure(figsize=(12,8))
plt.title("Analysis of Temp")
sns.barplot(x='months',y='Temp',data=dates,order=dates['months'].value_count
plt.xlabel('months',fontsize=15)
plt.show()

```

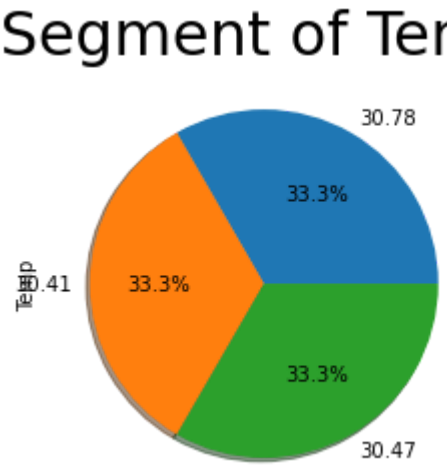


In [35]:
```
sns.pairplot(dates,hue='months')
plt.show()
```




# Pie chart of max Temp

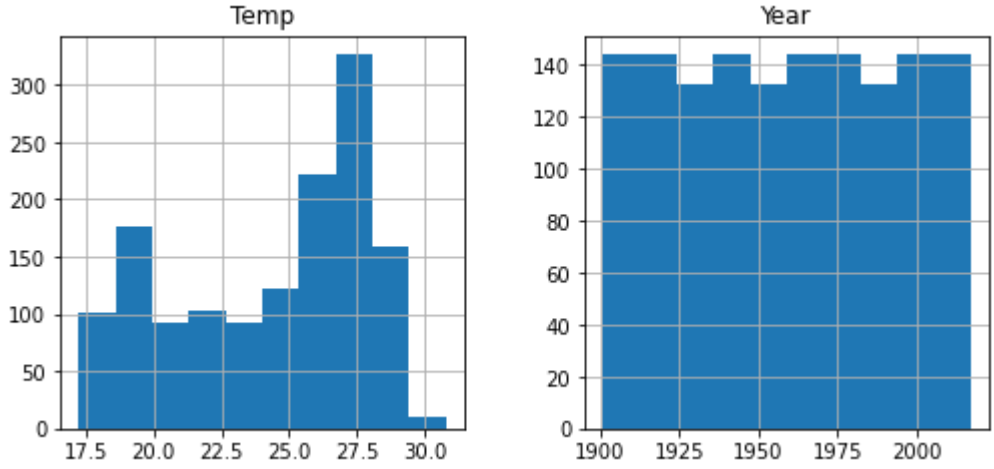
In [36]:
```
plt.title('Segment of Temp',fontsize=30)
High_Temp['Temp'].value_counts().plot.pie(autopct='%1.1f%%',shadow=True)
plt.show()
```




# Hist Plot

In [37]:
```
dates.hist(figsize=(13,13),layout=(3,3),sharex=False)
```

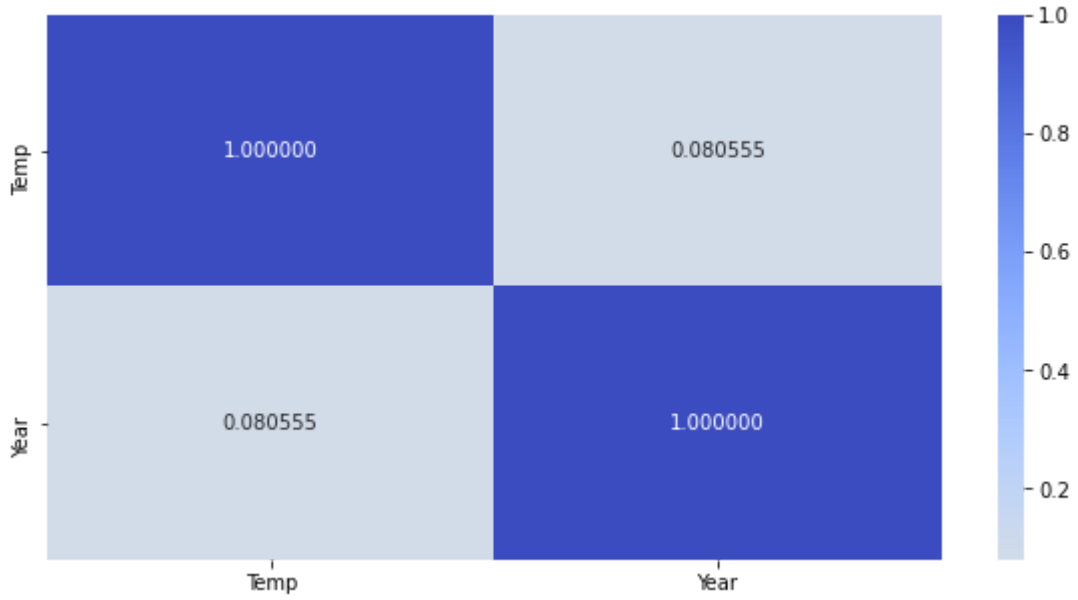
Out[37]:
```
array([[<AxesSubplot:title={'center':'Temp'}>,
        <AxesSubplot:title={'center':'Year'}>, <AxesSubplot:>],
       [<AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>],
       [<AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>]], dtype=object)
```



In [38]:
```
#Heatmap
```

In [39]:
```
plt.figure(figsize=(10,5))
sns.heatmap(dates.corr(),annot=True,fmt='4f',cmap='coolwarm_r',center=0)
```

Out[39]: <AxesSubplot:>




#conclusion

*** By analysing the bar plot we analyse that may and june are the top hot months in India.**

*****

*** By analsying the top max temp by using the pie chart, we say that 33.3% in the dataset has the temperature 30.78, 33.3% data in the dataset have the temp 30.45**

*** By using Histogrm we count the number of temperatures that shows in the datasets and apredict that temp 26 to 32 is the most frequent temperature that shows in the datset**

**Heatmap tell us there is highly correlation between tha temp and year.**