In [35]:
```
# import the required libraries
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
```

In [36]:
```
# read the dataset and load into a pandas dataframe
data = pd.read_csv("./flood_dataset.csv")
data.head()
```

Out[36]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	KERALA	1901	28.7	44.7	51.6	160.0	174.7	824.6	743.0	357.5	197.7	266.9	350.8	48.4
1	KERALA	1902	6.7	2.6	57.3	83.9	134.5	390.9	1205.0	315.8	491.6	358.4	158.3	121.5
2	KERALA	1903	3.2	18.6	3.1	83.6	249.7	558.6	1022.5	420.2	341.8	354.1	157.0	59.0
3	KERALA	1904	23.7	3.0	32.2	71.5	235.7	1098.2	725.5	351.8	222.7	328.1	33.9	3.3
4	KERALA	1905	1.2	22.3	9.4	105.9	263.3	850.2	520.5	293.6	217.2	383.5	74.4	0.2

In [37]:
```
# checking the shape of the dataset
print("Rows in dataset: ",data.shape[0])
print("Columns in dataset: ",data.shape[1])
```

```
Rows in dataset:  118
Columns in dataset:  16
```

In [38]:
```
# checking if there is any missing value in the data
data.isnull().sum()
```

Out[38]:
```
SUBDIVISION       0
YEAR              0
JAN               0
FEB               0
MAR               0
APR               0
MAY               0
JUN               0
JUL               0
AUG               0
SEP               0
OCT               0
NOV               0
DEC               0
ANNUAL_RAINFALL   0
FLOODS            0
dtype: int64
```

In [39]:
```
# replacing Yes and No with 1 and 0 respectively
data["FLOODS"].replace(["YES","NO"],[1,0], inplace=True)
```

In [40]:
```
data.head()
```

Out[40]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	KERALA	1901	28.7	44.7	51.6	160.0	174.7	824.6	743.0	357.5	197.7	266.9	350.8	48.4
1	KERALA	1902	6.7	2.6	57.3	83.9	134.5	390.9	1205.0	315.8	491.6	358.4	158.3	121.5
2	KERALA	1903	3.2	18.6	3.1	83.6	249.7	558.6	1022.5	420.2	341.8	354.1	157.0	59.0
3	KERALA	1904	23.7	3.0	32.2	71.5	235.7	1098.2	725.5	351.8	222.7	328.1	33.9	3.3
4	KERALA	1905	1.2	22.3	9.4	105.9	263.3	850.2	520.5	293.6	217.2	383.5	74.4	0.2

Data Splitting

In [41]:
```
# Dropping column SUBDIVISION, ANNUAL_RAINFALL since it does not have a correlation wit
data.drop(columns=["SUBDIVISION","ANNUAL_RAINFALL"],inplace=True)
data.head()
```

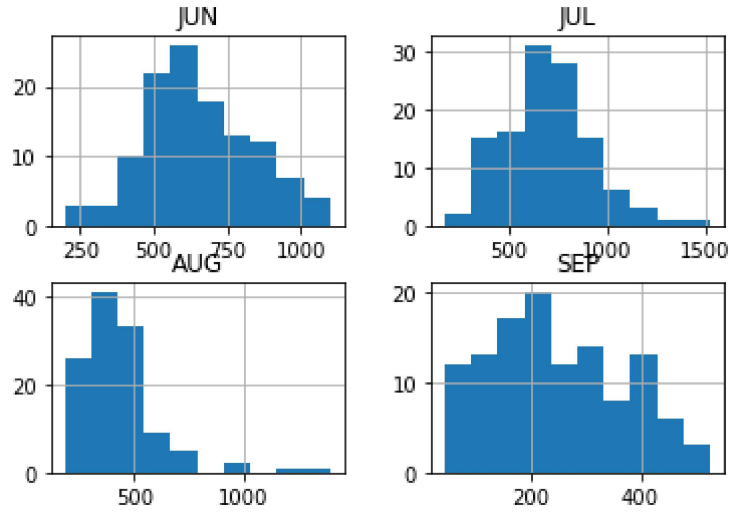
Out[41]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	FLOODS
0	1901	28.7	44.7	51.6	160.0	174.7	824.6	743.0	357.5	197.7	266.9	350.8	48.4	1
1	1902	6.7	2.6	57.3	83.9	134.5	390.9	1205.0	315.8	491.6	358.4	158.3	121.5	1
2	1903	3.2	18.6	3.1	83.6	249.7	558.6	1022.5	420.2	341.8	354.1	157.0	59.0	1
3	1904	23.7	3.0	32.2	71.5	235.7	1098.2	725.5	351.8	222.7	328.1	33.9	3.3	1
4	1905	1.2	22.3	9.4	105.9	263.3	850.2	520.5	293.6	217.2	383.5	74.4	0.2	0

In [42]:
```
# Splitting the data into dependent variables(X) and the required target valiable(Y)
X = data.iloc[:,0:13]
Y = data["FLOODS"]
Y.head()
```

Out[42]:
```
0    1
1    1
2    1
3    1
4    0
Name: FLOODS, dtype: int64
```

In [43]:
```
# checking the distribution of data by plotting a histogram
# checking for only the months falling under the rainy season because only these months
X.iloc[:,6:10].hist()
plt.show()
```



Data Normalization

In [44]:
```
# Since the is not distributed evenly, we can scale it in the range of 0 to 1
scaler = MinMaxScaler(feature_range=(0,1))
scaler.fit(X).transform(X)
```

Out[44]:
```
array([[0.        , 0.34371257, 0.56582278, ..., 0.39727673, 0.95570189,
        0.2388724 ],
       [0.00854701, 0.08023952, 0.03291139, ..., 0.5804966 , 0.37952709,
        0.60039565],
       [0.01709402, 0.03832335, 0.23544304, ..., 0.57188626, 0.37563604,
        0.29129575],
       ...,
       [0.98290598, 0.02874251, 0.04810127, ..., 0.31517821, 0.28105358,
        0.11622156],
       [0.99145299, 0.02275449, 0.08607595, ..., 0.24809772, 0.18258007,
        0.18793274],
       [1.        , 0.34850299, 0.65949367, ..., 0.57589107, 0.28105358,
        0.3214639 ]])
```

Train Test Splitting

In [45]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X,Y, test_size = 0.2)
```

Predicting Results and Comparing Models

In [46]:
```
# Loading the models
logistic = LogisticRegression(solver="liblinear", random_state=42)
random_forest = RandomForestClassifier(n_estimators=10, random_state=42)
KNN = KNeighborsClassifier()
```

In [47]:
```
# Training the model on the training sets
model1 = logistic.fit(X_train, Y_train)
model2 = random_forest.fit(X_train, Y_train)
model3 = KNN.fit(X_train, Y_train)
```

In [48]:
```
Y_pred1 = model1.predict(X_test)
```

In [49]:
```
Y_pred2 = model2.predict(X_test)
```

In [50]:
```
Y_pred3 = model3.predict(X_test)
```

In [51]:
```
# Comparing the accuracy score of all the three models
print("\t\tACCURACY SCORES")
print("Logistic Regression: ",accuracy_score(Y_test,Y_pred1))
print("Random Forest Regressor: ",accuracy_score(Y_test,Y_pred2))
print("K-Nearest Neighbour(KNN): ",accuracy_score(Y_test,Y_pred3))
```

```
                ACCURACY SCORES
Logistic Regression:  0.9583333333333334
Random Forest Regressor:  0.7083333333333334
K-Nearest Neighbour(KNN):  0.9166666666666666
```

From the above results, Logistic Regression is the best model for flood prediction.

Prediction of flood before-hand by analysing the rainfall in different months helps us in getting ready for the flood in advance. So this will help in reducing the after effects of flood and will help in flood management.

In [52]:
```
# Exporting the models
import joblib
joblib.dump(model1,'Logistic_Regression.joblib')
joblib.dump(model2,'Random_Forest_Regressor.joblib')
joblib.dump(model3,'KNearestNeighbour.joblib')
```

Out[52]:
```
['KNearestNeighbour.joblib']
```

Loading the model

we can load the "model_name.joblib" file by importing the joblib library then,

> model = joblib.load('model_name.joblib')

To make predictions using the model, we can pass a numpy nd-array to the loaded model as,

> predictions = model_loaded.predict([[YEAR,JAN,FEB,MAR,APR,MAY,JUN,JULY,AUG,SEP,OCT,NOV,DEV], [..], ...)

In [57]:
```
# Using the Logistic Regression Model to predict
model = joblib.load("./Logistic_Regression.joblib")
prediction = model.predict([[2008, 0.8, 30.3, 217.2, 108.4, 81.2, 469.9, 505.1, 349, 34
if prediction == 1:
    print("YES, There maybe a flood")
else:
    print("NO, There may not be a flood")
```

```
NO, There may not be a flood
```