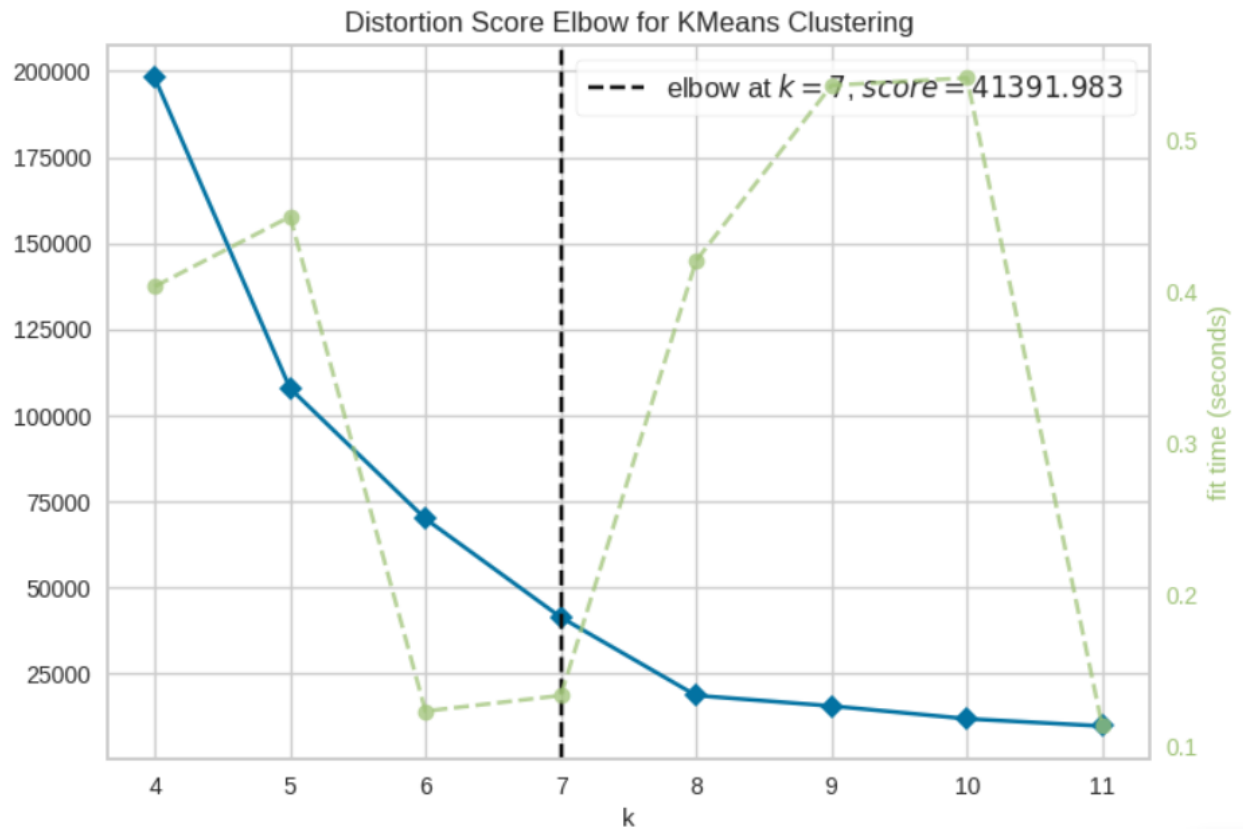


Kịch bản chia data:



Ảnh training Bayesian Gaussian Mixture:

```
[15] BGM = BayesianGaussianMixture(n_components=7,covariance_type='full',random_state=1,n_init=15)
      # fit model and predict clusters
      preds = BGM.fit_predict(X)

      #Adding the Clusters feature to the original dataframe.
      df["Clusters"]= preds
```

Ảnh kết quả Bayesian Gaussian Mixture:

```

[200] valid_0's multi_logloss: 0.000151038
[400] valid_0's multi_logloss: 0.000151038
[200] valid_0's multi_logloss: 0.000151576
[400] valid_0's multi_logloss: 0.000151576
[200] valid_0's multi_logloss: 0.00015433
[400] valid_0's multi_logloss: 0.00015433
[200] valid_0's multi_logloss: 0.000155486
[400] valid_0's multi_logloss: 0.000155486
[200] valid_0's multi_logloss: 0.000153559
[400] valid_0's multi_logloss: 0.000153559
[200] valid_0's multi_logloss: 0.000155711
[400] valid_0's multi_logloss: 0.000155711
[200] valid_0's multi_logloss: 8.58365e-06
[400] valid_0's multi_logloss: 8.48634e-06
[600] valid_0's multi_logloss: 8.42158e-06
[800] valid_0's multi_logloss: 8.37546e-06
[1000] valid_0's multi_logloss: 8.34101e-06
[1200] valid_0's multi_logloss: 8.3143e-06
[1400] valid_0's multi_logloss: 8.29302e-06
[1600] valid_0's multi_logloss: 8.27566e-06
[1800] valid_0's multi_logloss: 8.26123e-06
[2000] valid_0's multi_logloss: 8.24906e-06
[2200] valid_0's multi_logloss: 8.23866e-06
[2400] valid_0's multi_logloss: 8.22966e-06
[2600] valid_0's multi_logloss: 8.2218e-06
[2800] valid_0's multi_logloss: 8.21489e-06
[3000] valid_0's multi_logloss: 8.20875e-06
[3200] valid_0's multi_logloss: 8.20327e-06
[3400] valid_0's multi_logloss: 8.19834e-06
[3600] valid_0's multi_logloss: 8.19389e-06
[3800] valid_0's multi_logloss: 8.18985e-06
[4000] valid_0's multi_logloss: 8.18617e-06
[4200] valid_0's multi_logloss: 8.1828e-06
[4400] valid_0's multi_logloss: 8.1797e-06
[4600] valid_0's multi_logloss: 8.17684e-06
[4800] valid_0's multi_logloss: 8.1742e-06
[5000] valid_0's multi_logloss: 8.17175e-06
[200] valid_0's multi_logloss: 0.000220707
[400] valid_0's multi_logloss: 0.000220707
[200] valid_0's multi_logloss: 0.000156024
[400] valid_0's multi_logloss: 0.000156024
[200] valid_0's multi_logloss: 0.0120099
[400] valid_0's multi_logloss: 0.0120099
[200] valid_0's multi_logloss: 0.0238626

```

Ảnh training Arima:

```
[24] from statsmodels.tsa.arima.model import ARIMA
```

```
# Khởi tạo và phù hợp với mô hình ARIMA
model_arima = ARIMA(r_t, order=(2, 0, 2))
model_fit = model_arima.fit()
```

```
# In ra tóm tắt của mô hình
print(model_fit.summary())
```

Ảnh kết quả Arima:

```
=====
                        SARIMAX Results
=====
Dep. Variable:          y      No. Observations:          365
Model:                 ARIMA(2, 0, 2)  Log Likelihood          563.223
Date:                 Tue, 07 May 2024  AIC                  -1114.446
Time:                  03:41:01  BIC                  -1091.047
Sample:                0      HQIC                  -1105.147
                        - 365
Covariance Type:       opg
=====
              coef    std err          z      P>|z|      [0.025    0.975]
-----
const      -4.829e-06    0.001     -0.006    0.995    -0.002    0.002
ar.L1       -0.1328      0.059     -2.233    0.026    -0.249   -0.016
ar.L2        0.5723      0.054     10.593    0.000     0.466    0.678
ma.L1       -0.0099      0.040     -0.249    0.804    -0.087    0.068
ma.L2       -0.8488      0.043    -19.543    0.000    -0.934   -0.764
sigma2       0.0027      0.000     25.500    0.000     0.002    0.003
=====
Ljung-Box (L1) (Q):          0.26  Jarque-Bera (JB):          665.01
Prob(Q):                    0.61  Prob(JB):              0.00
Heteroskedasticity (H):      1.72  Skew:                  0.50
Prob(H) (two-sided):         0.00  Kurtosis:              9.54
=====
```