In [1]:
```
import os
import pandas as pd
import random
```

Agrupamiento

In [2]:
```
dc = pd.read_csv('AMD_clustering_0.csv')

for d in dc:
    dc = dc[dc[d].notna()]

dc.info()
dc.head()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3820518 entries, 0 to 3820517
Data columns (total 5 columns):
 #   Column  Dtype  
---  ------  -----  
 0   SS      float64
 1   ST      float64
 2   CH      float64
 3   ML      float64
 4   fC      float64
dtypes: float64(5)
memory usage: 174.9 MB
```

Out[2]:

	SS	ST	CH	ML	fC
0	0.83550	0.467500	0.004328	0.034988	0.291824
1	0.82925	0.443889	0.004874	0.036527	0.289788
2	0.83225	0.445000	0.003185	0.037753	0.295944
3	0.82075	0.434722	0.003215	0.041143	0.287854
4	0.82125	0.436944	0.003215	0.041143	0.288577

In [3]:
```
data = dc[['SS', 'ST', 'CH', 'ML']]

data_norm = (data-data.min())/(data.max()-data.min())
data_sample = data_norm.sample(frac=0.01)
data_sample.head()
```

Out[3]:

	SS	ST	CH	ML
2855783	0.914557	0.753419	0.004809	0.000000
1140739	0.879616	0.637136	0.001369	0.017868
606812	0.916645	0.561009	0.002588	0.080666
3110600	0.876993	0.866621	0.000948	0.013380
699690	0.932486	0.734938	0.000671	0.044515

In [4]:
```
from matplotlib import pyplot as plt
from sklearn import datasets
```

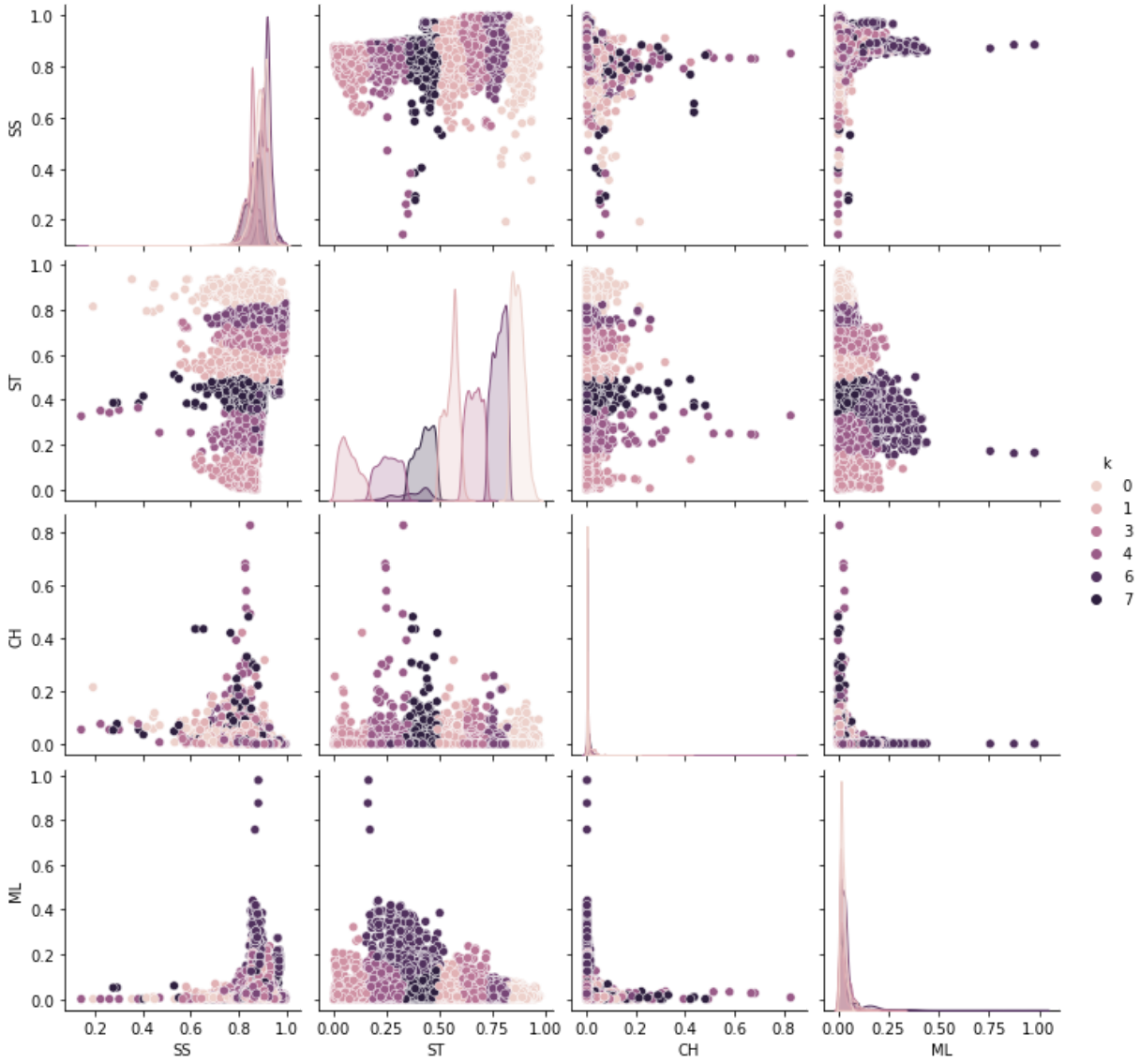
```
import seaborn as sb
```

In [5]:

```
from sklearn.cluster import KMeans

model = KMeans()
out = data_sample.copy()
out['k'] = model.fit_predict(out)

sb.pairplot(out, hue='k')
```

Out[5]:

```
<seaborn.axisgrid.PairGrid at 0x7faabadb1340>
```

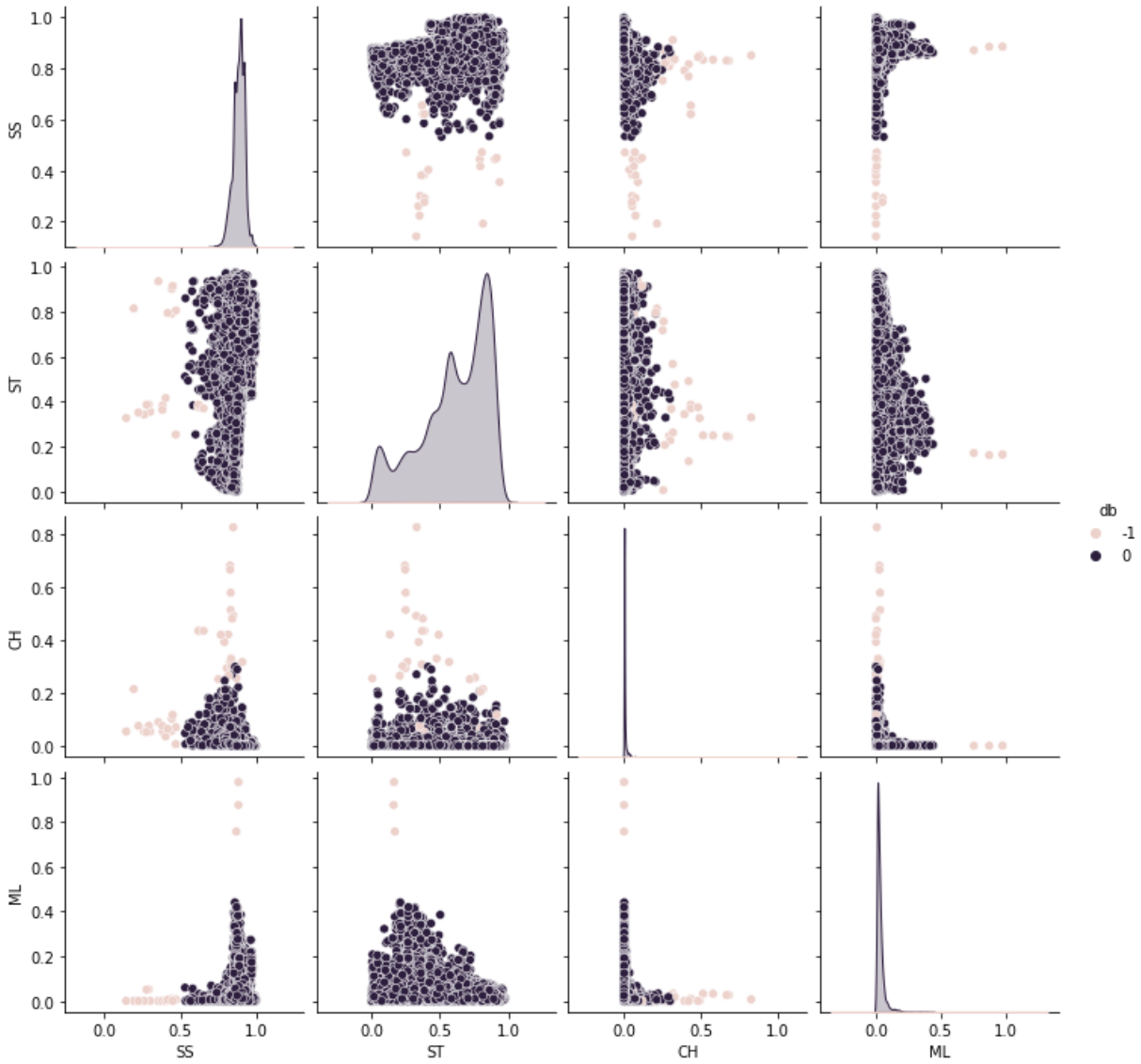


In [7]:

```
from sklearn.cluster import DBSCAN

model = DBSCAN(eps=0.1, min_samples=10)
out = data_sample.copy()
out['db'] = model.fit_predict(out.to_numpy())

sb.pairplot(out, hue='db')
```

Out[7]:

```
<seaborn.axisgrid.PairGrid at 0x7faab620e850>
```



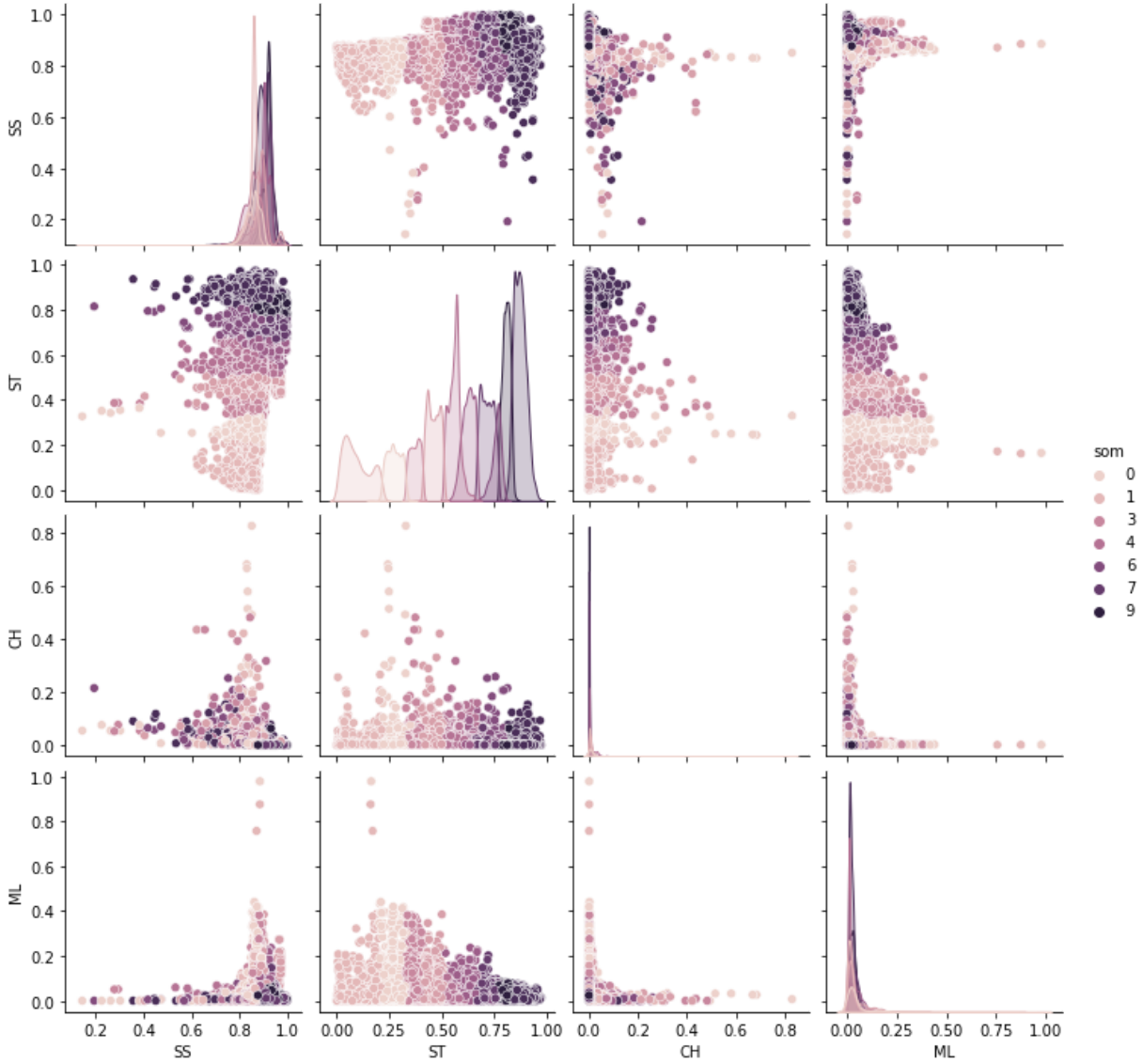
In [11]:

```
!pip install sklearn_som
from sklearn_som.som import SOM

model = SOM(m=5, n=2, dim=len(data_sample.columns))
out = data_sample.copy()
out['som'] = model.fit_predict(out.to_numpy())

sb.pairplot(out, hue='som')
```

```
Requirement already satisfied: sklearn_som in /opt/conda/lib/python3.9/site-packages
(1.1.0)
Requirement already satisfied: numpy in /opt/conda/lib/python3.9/site-packages (from
sklearn_som) (1.20.3)
```

Out[11]:

```
<seaborn.axisgrid.PairGrid at 0x7faab40e9f10>
```



Regresión

In [12]:

```
df = pd.read_csv('AMD_regression_0.csv')

for d in df:
    df = df[df[d].notna()]

df = df.sample(frac=0.005)

df.info()
df.head()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 19103 entries, 985206 to 770894
Data columns (total 9 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   SS      19103 non-null  float64
 1   ST      19103 non-null  float64
 2   CH      19103 non-null  float64
 3   ML      19103 non-null  float64
 4   SL      19103 non-null  float64
 5   LA      19103 non-null  float64
 6   DA      19103 non-null  float64
 7   CL      19103 non-null  float64
```

```
 8   fC      19103 non-null  float64
dtypes: float64(9)
memory usage: 1.5 MB
```

Out[12]:

	SS	ST	CH	ML	SL	LA	DA	CL	fC
985206	0.860100	0.813944	0.001318	0.028802	0.090408	0.455650	0.431155	0.213234	0.440480
1695376	0.911825	0.832917	0.002109	0.045523	0.499188	0.500233	0.412061	0.000001	0.406252
1163612	0.872200	0.811111	0.000513	0.027132	0.334531	0.609672	0.301102	0.028174	0.332627
2905683	0.906750	0.730389	0.004462	0.021417	0.007555	0.654833	0.604006	0.586591	0.337558
3632910	0.884525	0.859639	0.001223	0.048123	0.367929	0.466122	0.649470	0.017758	0.361209

In [13]:
```
from matplotlib import pyplot as plt
from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn import preprocessing
```

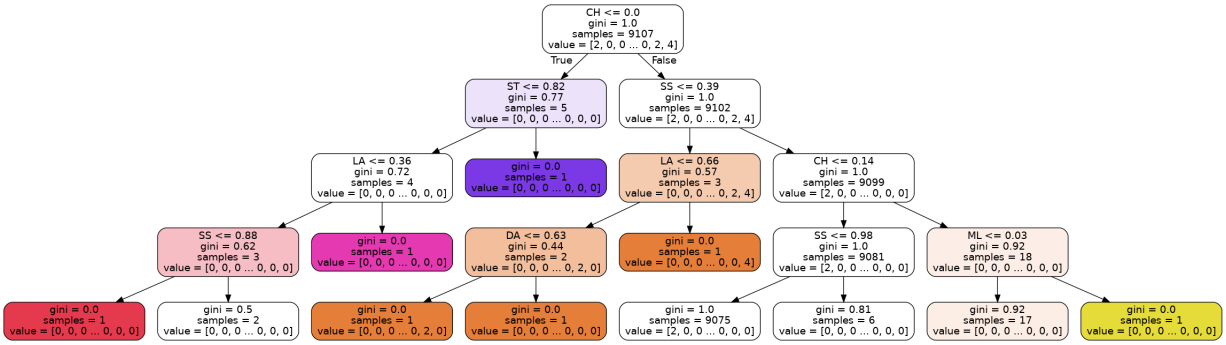
In [14]:
```
x = df[['SS', 'ST', 'CH', 'ML', 'SL', 'LA', 'DA', 'CL']]
y = df['fC']

seed = random.randint(0, 10000000)
x_train, x_test, y_train, y_test = train_test_split(x, y, random_state=seed)
lab_enc = preprocessing.LabelEncoder()
y_train = lab_enc.fit_transform(y_train)
y_test = lab_enc.fit_transform(y_test)
```

In [15]:
```
estimate = RandomForestClassifier(max_depth=4, random_state=seed)
estimate.fit(x_train, y_train)
```

Out[15]:
```
RandomForestClassifier(max_depth=4, random_state=5007743)
```

In [16]:
```
from sklearn.tree import export_graphviz

export_graphviz(estimate.estimators_[0],
                out_file='tree.dot',
                feature_names=['SS', 'ST', 'CH', 'ML', 'SL', 'LA', 'DA', 'CL'],
                rounded=True, proportion = False,
                precision=2, filled = True)

from subprocess import call
call(['dot', '-Tpng', 'tree.dot', '-o', 'tree.png'])

from IPython.display import Image
Image(filename = 'tree.png')
```

Out[16]:



In [17]:

```
print(estimate.score(x_test, y_test))
y_predict = estimate.predict(x_test)

print(y_predict[:10])
print(y_test[:10])
```

```
0.00020938023450586265
[5216 5216 6903  521 5216 5216 5216 5216 5216 5216]
[2186 3827 3772  180 1730 3158 2472 1156  197  642]
```

In [19]:

```
from sklearn.neural_network import MLPClassifier

clf = MLPClassifier(hidden_layer_sizes=(1,), random_state=seed)
clf.fit(x_train, y_train)
```

Out[19]:

```
MLPClassifier(hidden_layer_sizes=(1,), random_state=5007743)
```

In [20]:

```
print(clf.score(x_test, y_test))
y_predict = clf.predict(x_test)

print(y_test[:10])
print(y_predict[:10])
```

```
0.0
[2186 3827 3772  180 1730 3158 2472 1156  197  642]
[5216 5216 5216 5216 5216 5216 5216 5216 5216 5216]
```