prova

June 14, 2022

Bibliotecas:

[1]:
```
import simpful as sf
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
FS = sf.FuzzySystem()
```

```
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```

Antecedentes:

[3]:
```
sd = 1.5
S_1 = sf.FuzzySet(function = sf.Gaussian_MF(mu = -2, sigma = sd), term =␣
↪'menos_dois')
S_2 = sf.FuzzySet(function = sf.Gaussian_MF(mu = 2, sigma = sd), term =␣
↪'mais_dois')
FS.add_linguistic_variable('x', sf.LinguisticVariable([S_1, S_2],␣
↪universe_of_discourse = [-2, 2]))
```

Consequentes:

[4]:
```
FS.set_crisp_output_value('MENOS_UM', -1)
FS.set_crisp_output_value('MAIS_UM', 1)
```

```
* Detected Sugeno model type
```

Regras:

[5]:
```
RULE1 = 'IF (x IS menos_dois) THEN (y IS MENOS_UM)'
RULE2 = 'IF (x IS mais_dois) THEN (y IS MAIS_UM)'
FS.add_rules([RULE1, RULE2])
```

Avaliação:

[6]:
```
N = 100
X = np.linspace(start = -2, stop = 2, num = N)
y = np.tanh(X)
yhat = []
for x in X:
    FS.set_variable('x', x)
    yhat.append(FS.Sugeno_inference(['y']).get('y'))

plt.plot(X, yhat)
plt.plot(X, y)
mse = np.sqrt(np.sum((y - yhat) ** 2)) / len(yhat)
print(mse)
```

```
0.0038730259748776413
```