Fuzzy Inference System

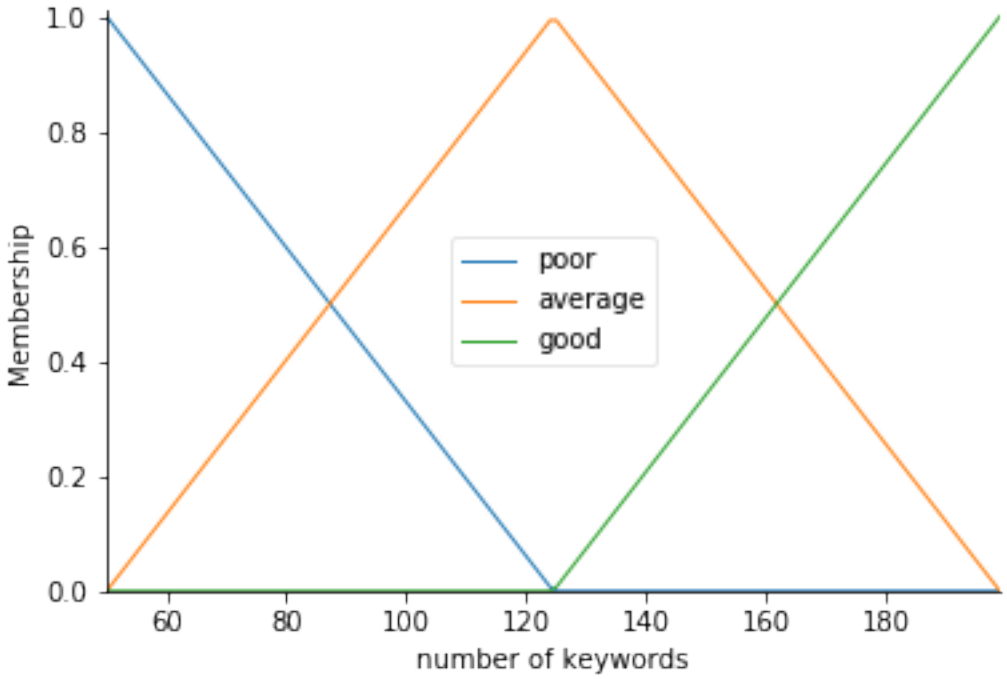
September 29, 2019

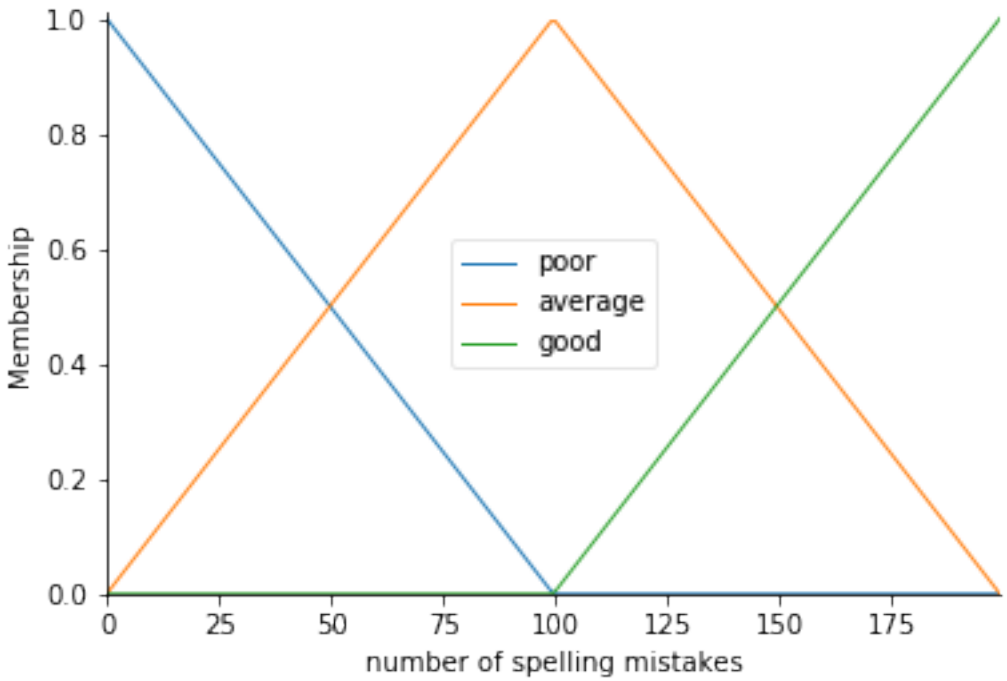
[0]:
```
import numpy as np
import skfuzzy as fuzz
import matplotlib.pyplot as plt
from skfuzzy import control as ctrl
```

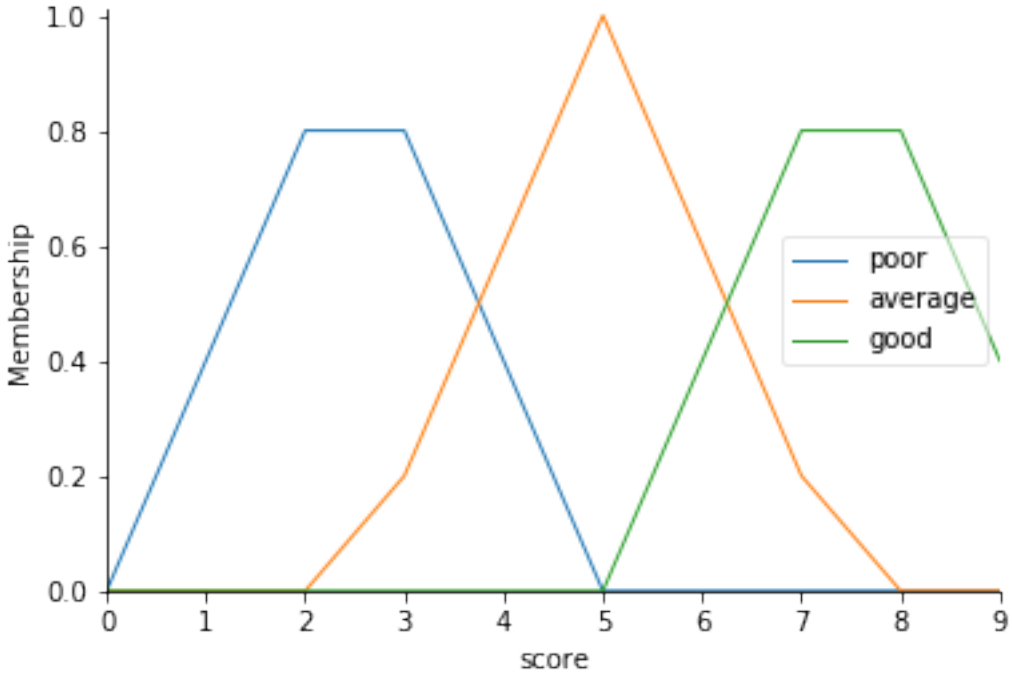
[0]:
```
# New Antecedent/Consequent objects hold universe variables and membership
number_of_keywords = ctrl.Antecedent(np.arange(50, 200, 1), 'number of keywords')
count_spelling_mistakes = ctrl.Antecedent(np.arange(0, 200, 1), 'number of␣
 ↪spelling mistakes')
score = ctrl.Consequent(range(0, 10, 1), 'score')

number_of_keywords.automf(3)
count_spelling_mistakes.automf(3)
score.automf(3)
score['poor'] = fuzz.trimf(score.universe, [0, 2.5, 5])
score['average'] = fuzz.trimf(score.universe, [2.5, 5, 7.5])
score['good']= fuzz.trimf(score.universe,[5, 7.5, 10])
```

[0]:
```
number_of_keywords.view()
count_spelling_mistakes.view()
score.view()

rules = [ctrl.Rule(number_of_keywords['poor'] |␣
 ↪count_spelling_mistakes['poor'], score['average']),
        ctrl.Rule(number_of_keywords['poor'] |␣
 ↪count_spelling_mistakes['average'], score['poor']),
        ctrl.Rule(number_of_keywords['poor'] | count_spelling_mistakes['good'],␣
 ↪score['poor']),

        ctrl.Rule(number_of_keywords['average'] |␣
 ↪count_spelling_mistakes['poor'], score['average']),
        ctrl.Rule(number_of_keywords['average'] |␣
 ↪count_spelling_mistakes['average'], score['average']),
        ctrl.Rule(number_of_keywords['average'] |␣
 ↪count_spelling_mistakes['good'], score['poor']),
```

```
        ctrl.Rule(number_of_keywords['good'] | count_spelling_mistakes['poor'],␣
↪score['good']),
        ctrl.Rule(number_of_keywords['good'] |␣
↪count_spelling_mistakes['average'], score['good']),
        ctrl.Rule(number_of_keywords['good'] | count_spelling_mistakes['good'],␣
↪score['average'])]
```




1.0
0.8
0.6
0.4
0.2
0.0
Membership
poor
average
good
0
25
50
75
100
125
150
175
number of spelling mistakes


1.0
0.8
0.6
0.4
0.2
0.0
Membership
poor
average
good
0
1
2
3
4
5
6
7
8
9
score

[0]:
```
score_ctrl = ctrl.ControlSystem(rules)
score = ctrl.ControlSystemSimulation(score_ctrl)
score.input['number of keywords'] = 100
score.input['number of spelling mistakes'] = 50
# Crunch the numbers
score.compute()
print(score.output['score'])
```

```
6.0317460317460325
```