

Testing

Few test cases were conducted to demonstrate if the system generate expected output as based on the rules and fuzzy membership designs.

Test Case 1: Input values of all variables are in the lowest

Input value: PM2.5 = 0, TVOC= 0, CO = 0, NO2 = 0, temperature = -15, humidity = 0

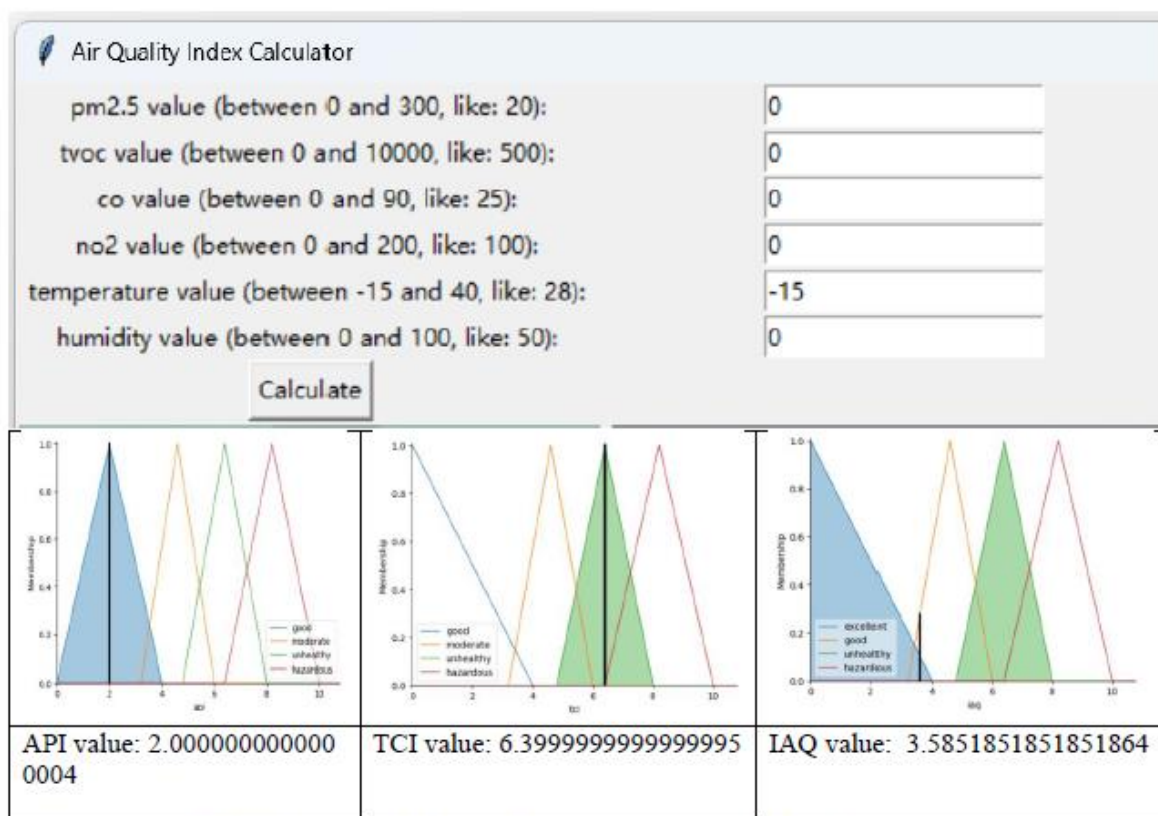


Figure 13 System output when inputs are in the low level.

Test Case 2: Input values of all variables are in moderate and high levels

Input value: PM_{2.5}= 35, TVOC = 620, CO = 19, NO₂ = 56, temperature = 20, humidity = 46

Expected Output: API in moderate level. TCI in good level. IAQ in good level.

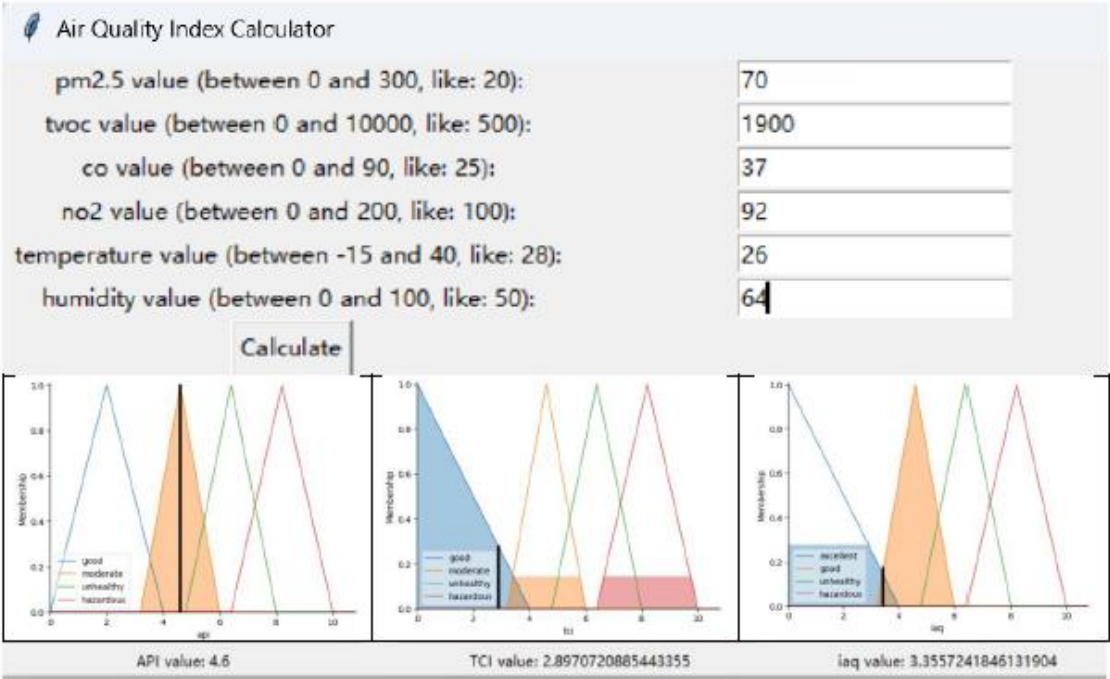


Figure 14 System output when inputs are in the moderate and high levels.

Test Case 3: Input values of all variables are in high and very high level

Input value: $PM_{2.5}$ =70, TVOC= 1900, CO = 37, NO₂ = 92, temperature = 26, humidity = 64

Expected Output: API in unhealthy level. TCI is close to hazardous level, IAQ in hazardous level.

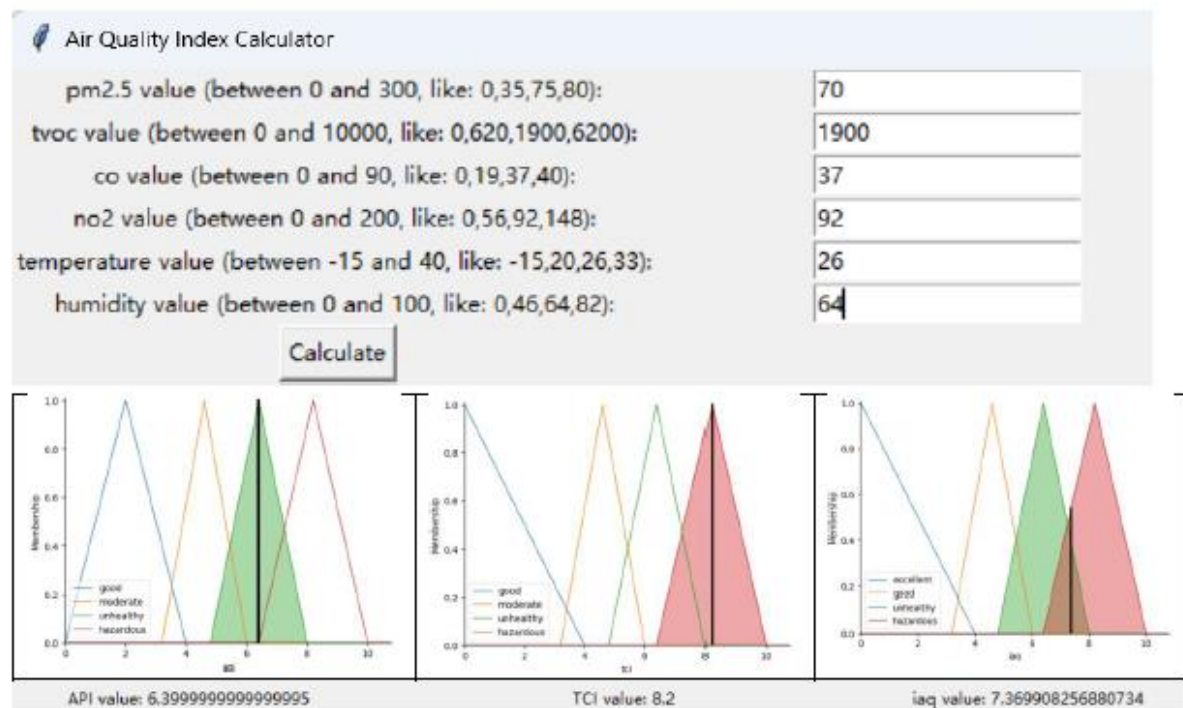


Figure 15 System output when inputs are in the high and very high level.

Test Case 4: Input values of all variables are in very high level

Input value: PM_{2.5} =190, TVOC = 6200, CO= 65, NO₂ = 148, temperature = 33, humidity = 82

Expected Output: API in hazardous level, TCI in hazardous level, IAQ in hazardous level.

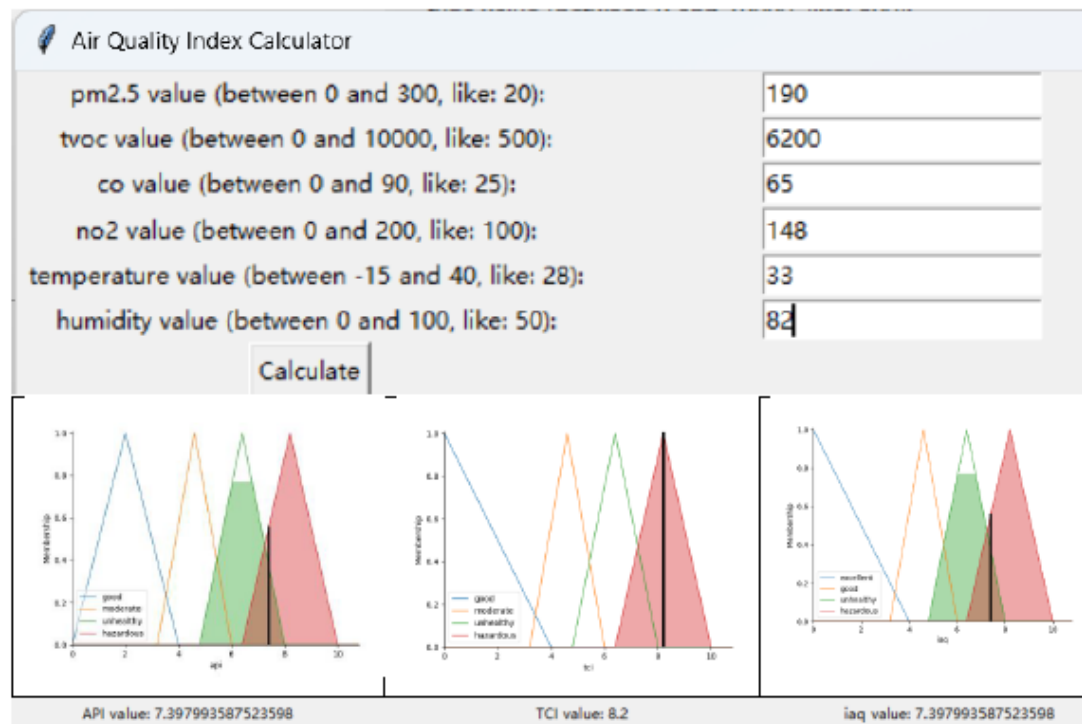


Figure 16 System output when inputs are in very high levels.

Test Case 5: Input values of all variables are in low and very high levels.

Input value: $PM_{2.5}$ =20, TVOC = 200, CO = 5, NO_2 = 148, temperature = 33, humidity = 82

Expected Output: API in good level, TCI in hazardous level, IAQ in unhealthy and hazardous level.

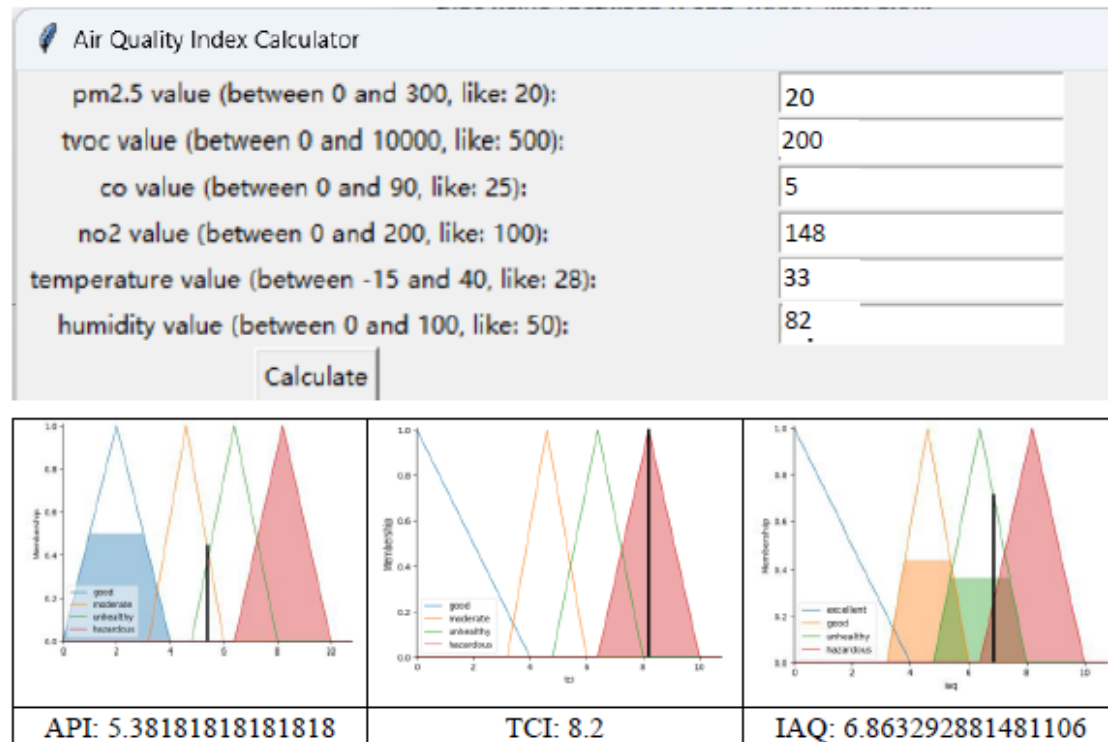


Figure 16 System output when inputs are in low and very high levels.

Test Case 6: Input values of all variables are in low and moderate levels

Input value: $PM_{2.5}$ =20, TVOC = 200, CO = 8, NO_2 = 50 temperature = 20, humidity = 40

Expected Output: API in excellent to good level, TCI in excellent level, IAQ in unhealthy and excellent level.

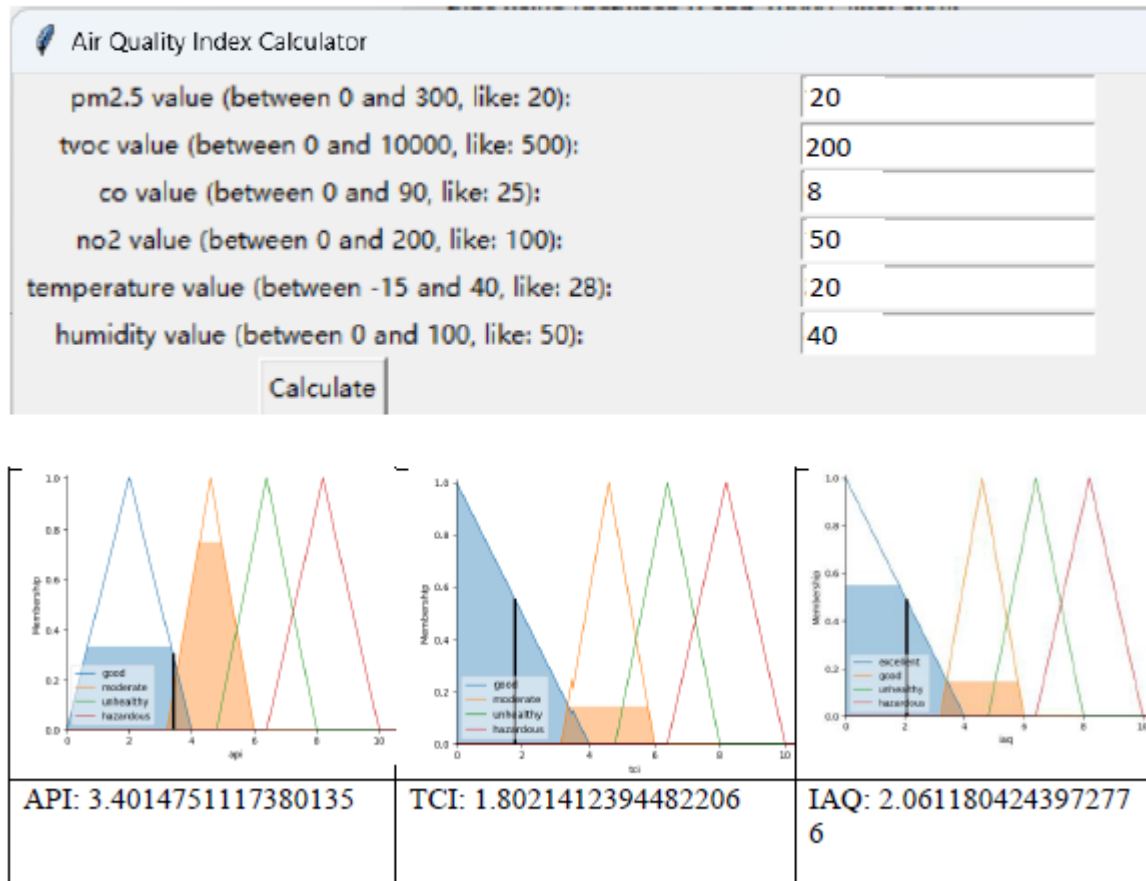


Figure 17 System output when inputs are in low and moderate levels