Visualize clusters

Also find latest algorithm already done to compare

Boruvka - Structural

Centrality - Pressure Diff

Robust network that even without demand gives a certain level of accuracy

And with demand only increases accuracy

ZJ-CLUSTERS

Pipe Length Boruvka Lev-3

a. 53 62 75 106 109 63

b. 108 107 64 94 61 114(r) 110 77 78 79

103

c. 103 105 104 100 113 13 80 81 82 86 87 90 88 84 83 91 98 97 95 93 92 96 99 101 102

d. 76 73 74 69 68 67 66 112 71 70 65 52 58 57 56 55 54

e. 29 30 60 59 31 46 47 48 45 44 43 49 50 111 42 41

f. 28 34 27 3 2 1 4 5 32 33 35 36 37 38

g. 6 7 8 9 10

h. 11 12 14 15 18 19 17 16 20 39 40 51

leak 12

{6: 0.08779600000000001, 11: 0.08798416666666665, 21: 0.08695136363636363, 29: 0.08450999999999999, 54: 0.07731333333333333, 106: 0.06559, 94: 0.060640000000000006, 86: 0.07200519999999999}

leak 58

{6: 0.07994399999999999, 11: 0.07994249999999999, 21: 0.0799240909090909, 29: 0.079795, 54: 0.08030555555555557, 106: 0.06721833333333334, 94: 0.062296, 86: 0.074372}

leak 100

{6: 0.074374, 11: 0.07437166666666668, 21: 0.07436181818181821, 29: 0.07429562500000002, 54: 0.07536166666666665, 106: 0.06773333333333333, 94: 0.063891, 86: 0.08231480000000001}

================== RESTART: F:\Spyder water codes\jacsim.py ==================

dict\_values([[1, 8, 30, 14, 2, 11, 3, 15, 13, 16, 17, 18, 19, 22, 23, 24, 26, 28, 27], [4, 5, 6, 7, 9, 12, 10, 25, 29, 20, 21]])

>>>

================== RESTART: F:\Spyder water codes\jacsim.py ==================

dict\_values([[1, 8, 30], [2, 11, 3, 14, 13, 15, 16, 17, 18, 19, 22, 23, 24, 26, 28, 27], [4, 5, 6, 7, 9, 12, 10, 25, 29, 21, 20]])

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Multiple leaks

minimisation or k sensors

pressure or flow

only leaks or what other events. type of leaks.

node or edge leak?

POSSIBLE DIFFERENCES

Consider different anomaly scenarios leaks pipe bursts and blockages

Different types of leaks, leak magnitudes

Application of leak localisation methods on our placemnet - which will work wich won't

Single reservoir

Multiple reservoirs - leak patterns are different

hierarchical clustering and placement of sensors

Literature Survey

Categories:

1. Leak Sensitivity Matrix

2. Entropy

3. Uncertainties

4. Combination of any 2 or all 3 using different algorithms, eg: GA

When network is expanded or sensors increased our algorithm is scalable

lean graphs algorithm is difficult to scale while increasing or decreasing sensors

Assume no blockages

Sensor Placement for Anomaly Detection

Single reservoir networks boruvka for all possible parameters

Balerma do colouring for boruvka clusters

\*\*What is leak sensitivity matrix and how do they use it what are the variations

What are the genetic algorithms and how is it used

\*\*Using entropy how do they do it

Uncertainties how it is characterised

\*\*will changing the network dynamically affect sensor placement

will their efficiency remain the same