# COE 4DN4 Assignment 1 -

# Steiner Trees for Broadcasting Data

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A) Please see the attached PDF file for specific algorithm flow chart
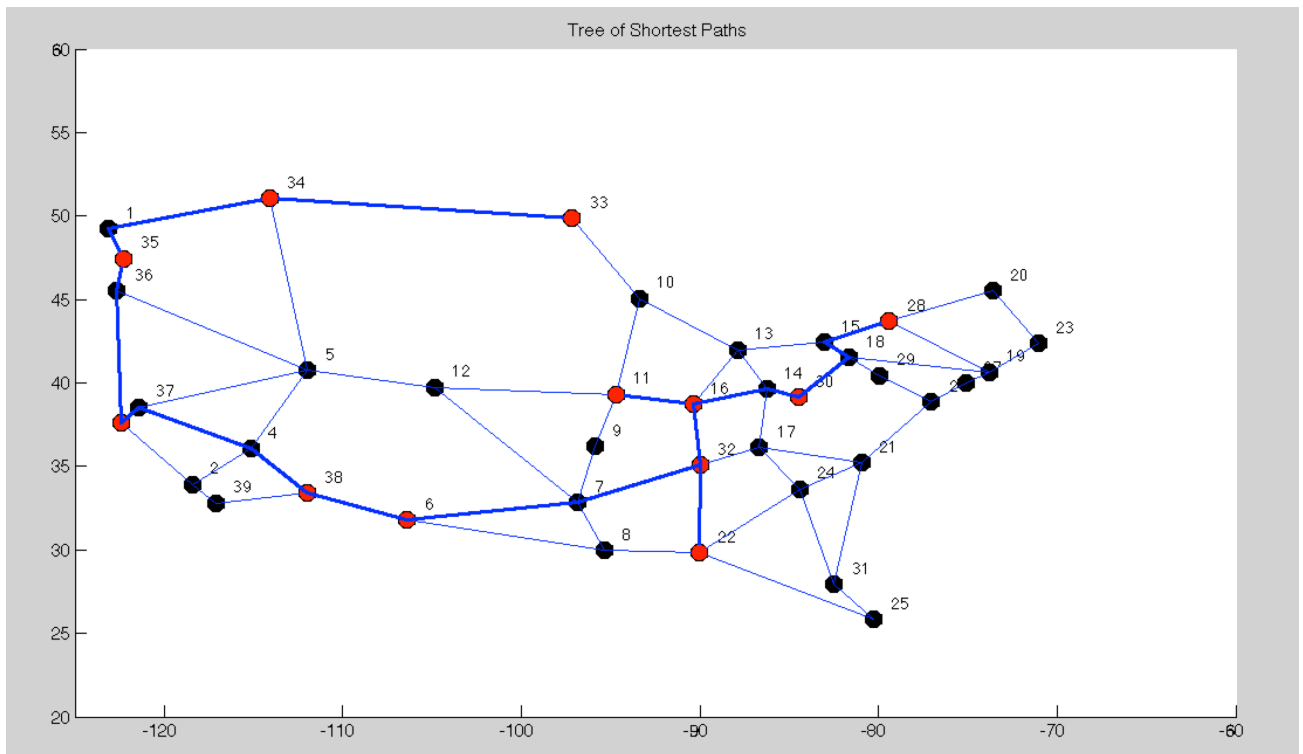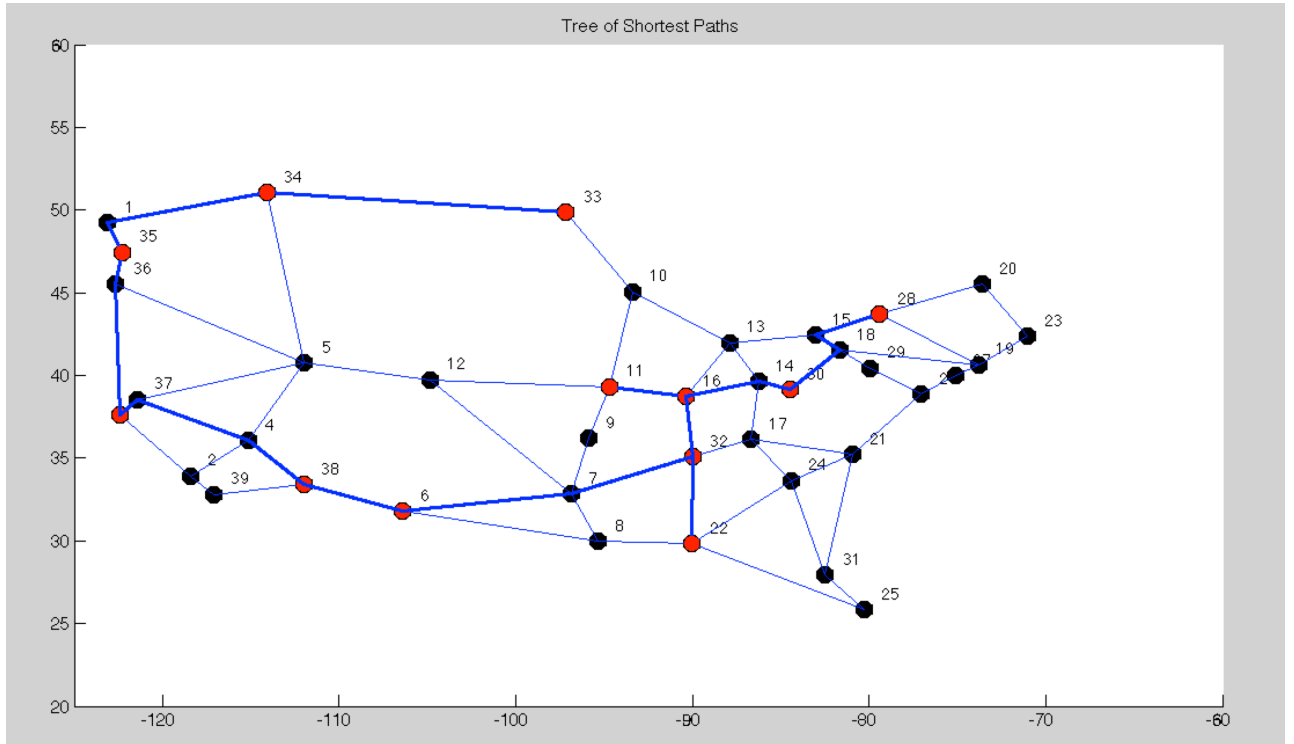
B)



Figure 1: best tree for source starting at 7.

Figure 2: best tree for source starting at 24

C)
From our calculation, the weight of Dijkstra tree of each vector is:

Vector 1: D(3)+D(35)+D(34)-D(5)+D(33)+D(28)+D(30)+D(22)-D(32) = 7636

Vector 2: D(39)+D(1)+D(16)-D(32)+D(33)+D(15)-D(14)-D(17)+D(23)+D(29)-D(26) = 7707

From our best tree algorithm, the weight of each best tree is:

Vector 1: 5975

Vector 2: 6938

D)

The total cost of Dijkstra tree of each vector in one year is:

Vector 1: 7636*12*1000 = $91632000

Vector 2: 7707*12*1000 = $92484000

The total cost of our best tree algorithm of each vector in one year is:

Vector 1: 5975*12*1000 = $71700000

Vector 2: 6938*12*1000 = $83256000

In conclusion we see that if we implement our best tree algorithm, we could save $19932000 in vector 1 and $9228000 in vector 2.

Comments on algorithm:

Although we saved a lot of money in our algorithm, there still exist some problems. Our time complexity is polynomial because we used two nested for loops to compare each element in the tree. However, we use a large amount of memory and deal with quite a bit certain situation in our code. For example, certain nodes in the recursive loop do not follow our algorithm so that we have to rule out those situations in order to make our code more efficiently.