ECE 471 Project 3

Honor Code:

I have neither given nor received unauthorized assistance on this graded report.

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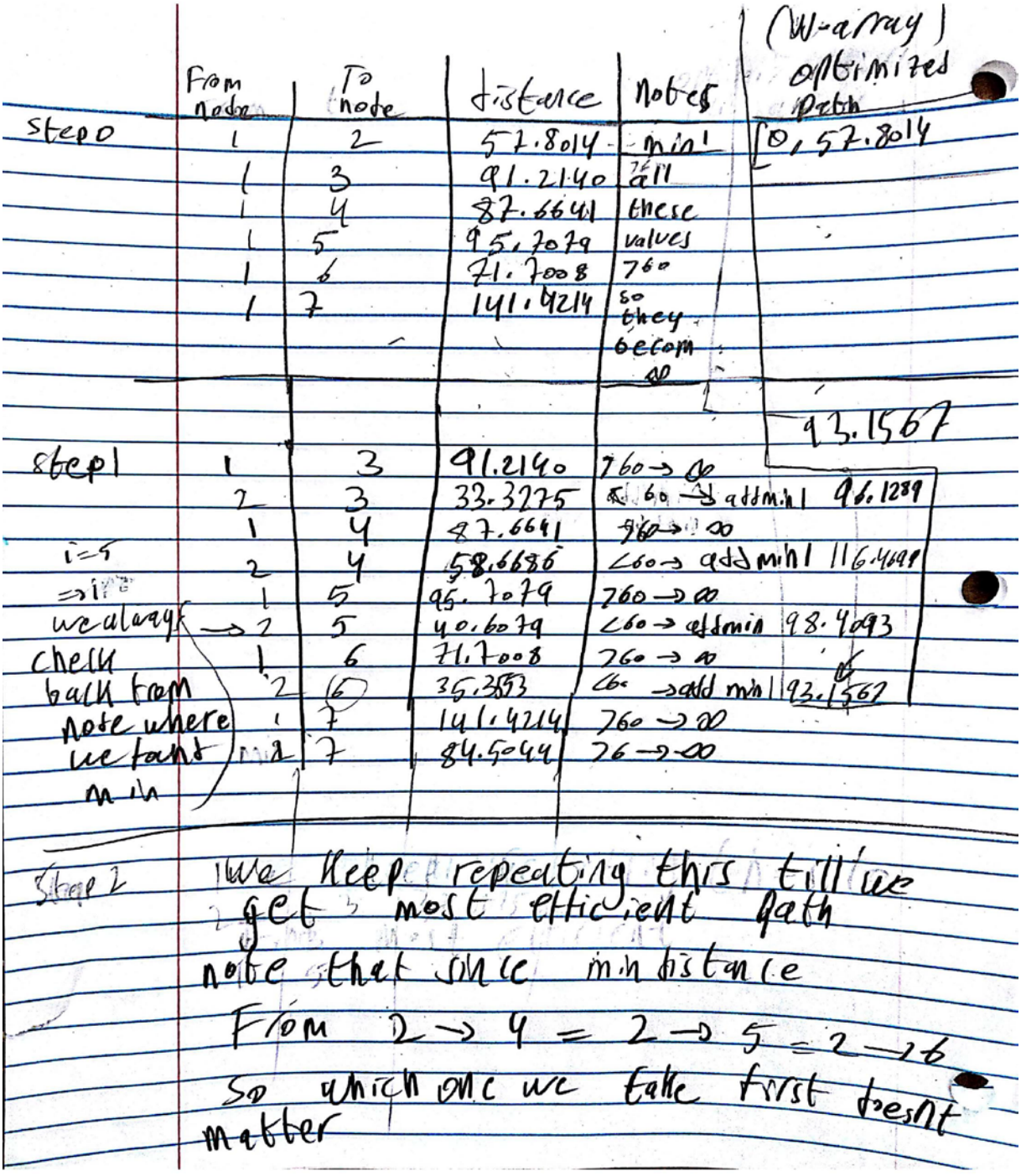
Contents

1) Explanation



	From node	To node	distance	Notes	(W-array) optimized Path
step 0	1	2	57.8014	min	0, 57.8014
	1	3	91.2140	all	
	1	4	87.6641	these	
	1	5	95.7079	values	
	1	6	71.7008	760	
	1	7	141.4214	so they become ∞	
					93.1567
step 1	1	3	91.2140	760 → ∞	
	2	3	33.3275	760 → add min	96.1289
	1	4	87.6641	760 → ∞	
i=5	2	4	58.6686	760 → add min	116.4989
⇒ i=2	1	5	95.7079	760 → ∞	
we always →	2	5	40.6079	760 → add min	98.4093
check back from	1	6	71.7008	760 → ∞	
node where we found	2	6	35.3553	760 → add min	93.1567
min	1	7	141.4214	760 → ∞	
	2	7	84.5044	760 → ∞	

Step 2 | We keep repeating this till we get most efficient path

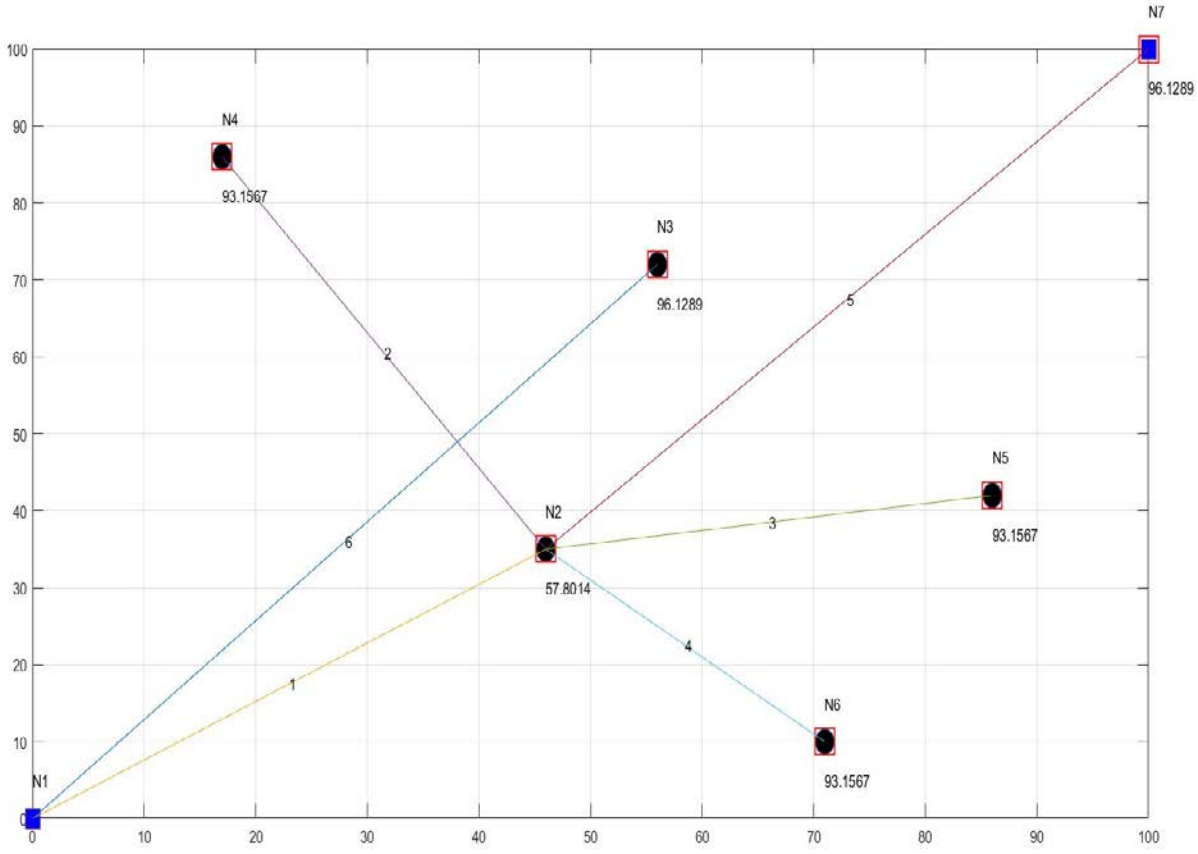
note that since min distance From 2 → 4 = 2 → 5 = 2 → 6 So which one we take first doesn't matter

2) Code

```
%routing algorithm
clear all; close all;
N=7; % DEFINES N
rand('seed',123456); % generates fixed random seed
x=randi([10, 90],1,N); % chooses N numberes between 10 and 90
y=randi([10, 90],1,N); % chooses N numberes between 10 and 90
x(1)=0; % sets first element in x to 0
y(1)=0; % sets first element in y to 0
x(N)=100; % sets last element in x to 100
y(N)=100; % sets first element in y to 100
figure % initializes a figure
plot(x(2:N-1),y(2:N-1),'o','markersize',15,'markerfacecolor','k'); %
plots all points (except first and last) according to x y coordinates
hold on;
plot([x(1) x(N)],[y(1)
y(N)],'s','markersize',15,'markerfacecolor','b'); % plots first and
last
grid on;
for i=1:N % names all the points
text(x(i),y(i)+5,strcat('N',num2str(i)));
end
source=[1]; % going from first point
dest=[2:N]; % to all points after
w=ones(1,N)*inf; % makes an array of N elements where each elemrnt is
set to inf (at first distance for all is inf)
w(1)=0; % sets first element in w to 0
for loop=1:N-1
    d=[];
    for i=1:length(dest)
        j=dest(i); % set j equal i'th element of dest array
        for k=1:length(source)
            l=source(k);
            dd=sqrt((x(j)-x(l))^2+(y(j)-y(l))^2); % dist formula
         if dd>60
            dd=inf;
          end
         d(i,k)=dd+w(l);
        end
    end
    dim=size(d);
    if dim(2)~=1
     d=min(d);
    end
    [md,idx]=min(d);
    j=dest(idx);
```

```
    plot(x(j),y(j),'rs','markersize',20,'linewidth',1.5);
    text(x(j),y(j)-5,num2str(md));
    source=[source j];
    dest(idx)=[];
    w(j)=md;
    plot([x(idx), x(j)] , [y(idx), y(j)]);
    text(((x(idx)+x(j))/2),((y(idx)+y(j))/2),num2str(loop));
    pause(1);
end
```

3) Output



4) Conclusion

I added line mapping between every nodes along with numbering for which step that line occurs on.

Placed here is an imbedded link to a video of the output