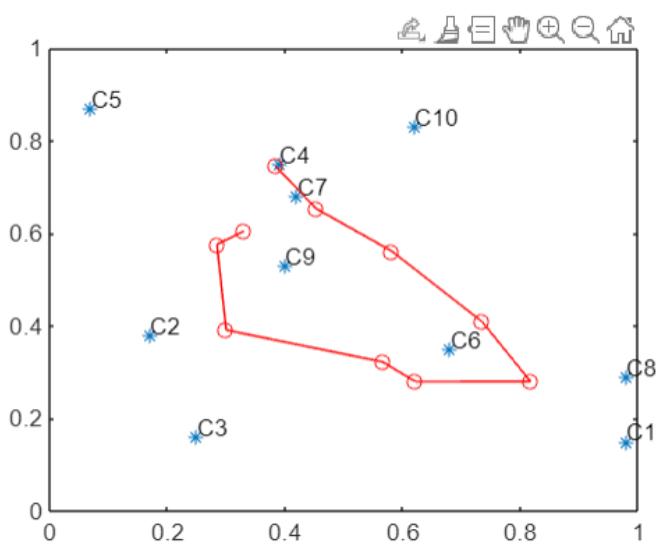
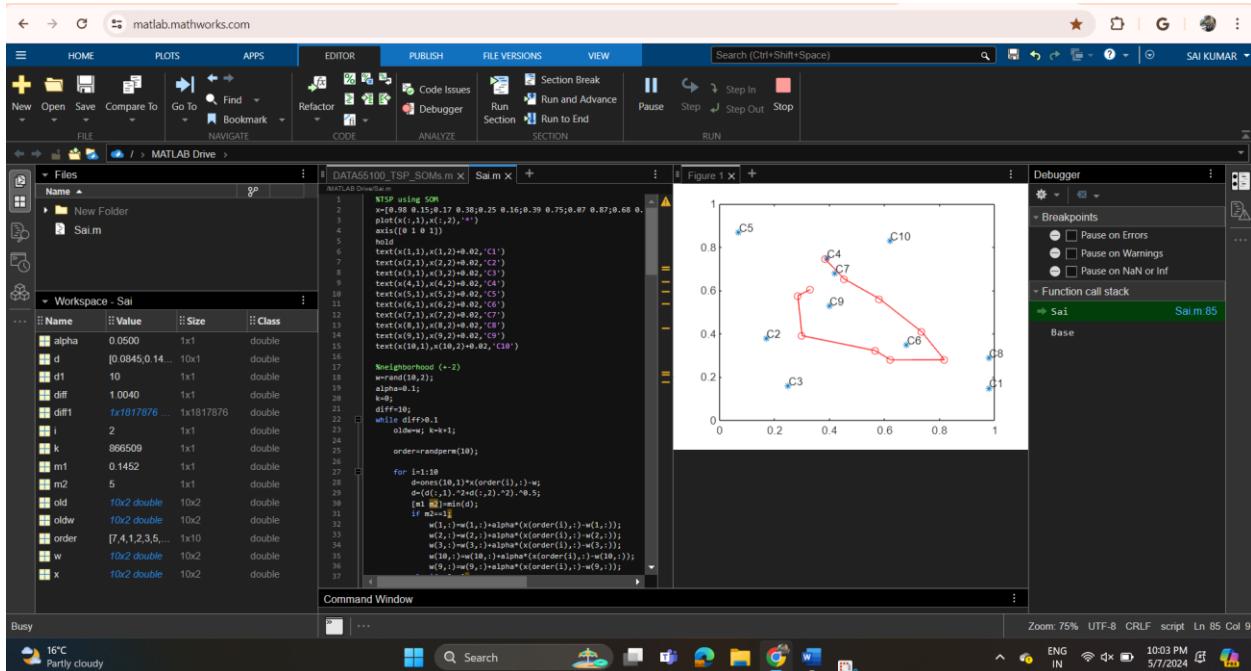


Unsupervised Machine Learning

Assignment 7

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This is using the MATLAB. I had the mentioned code Below.



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% neighborhood (+-0) case: It is neighborhood of (+/-0) I just performed code for these in the MATLAB and other cluster already provided.

This is Whole code of all Neighborhood.

```
%TSP using SOM
x=[0.98 0.15;0.17 0.38;0.25 0.16;0.39 0.75;0.07 0.87;0.68 0.35;0.42 0.68;0.98
0.29;0.40 0.53;0.62 0.83];
plot(x(:,1),x(:,2),'*')
axis([0 1 0 1])
hold
text(x(1,1),x(1,2)+0.02,'C1')
text(x(2,1),x(2,2)+0.02,'C2')
text(x(3,1),x(3,2)+0.02,'C3')
text(x(4,1),x(4,2)+0.02,'C4')
text(x(5,1),x(5,2)+0.02,'C5')
text(x(6,1),x(6,2)+0.02,'C6')
text(x(7,1),x(7,2)+0.02,'C7')
text(x(8,1),x(8,2)+0.02,'C8')
text(x(9,1),x(9,2)+0.02,'C9')
text(x(10,1),x(10,2)+0.02,'C10')

%neighborhood (+-2)
w=rand(10,2);
alpha=0.1;
k=0;
diff=10;
while diff>0.1
    oldw=w; k=k+1;

    order=randperm(10);

    for i=1:10
        d=ones(10,1)*x(order(i),:)-w;
        d=(d(:,1).^2+d(:,2).^2).^.5;
        [m1 m2]=min(d);
        if m2==1;
            w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
            w(2,:)=w(2,:)+alpha*(x(order(i),:)-w(2,:));
            w(3,:)=w(3,:)+alpha*(x(order(i),:)-w(3,:));
            w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
            w(9,:)=w(9,:)+alpha*(x(order(i),:)-w(9,:));
        elseif m2==2;
            w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
            w(2,:)=w(2,:)+alpha*(x(order(i),:)-w(2,:));
            w(3,:)=w(3,:)+alpha*(x(order(i),:)-w(3,:));
            w(4,:)=w(4,:)+alpha*(x(order(i),:)-w(4,:));
        end
    end
    diff=norm(w-oldw);
end
```

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```
w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
elseif m2==9;
    w(7,:)=w(7,:)+alpha*(x(order(i),:)-w(7,:));
    w(8,:)=w(8,:)+alpha*(x(order(i),:)-w(8,:));
    w(9,:)=w(9,:)+alpha*(x(order(i),:)-w(9,:));
    w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
    w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
elseif m2==10;
    w(8,:)=w(8,:)+alpha*(x(order(i),:)-w(8,:));
    w(9,:)=w(9,:)+alpha*(x(order(i),:)-w(9,:));
    w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
    w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
    w(2,:)=w(2,:)+alpha*(x(order(i),:)-w(2,:));
else
    for d1=m2-2:m2+2
        w(d1,:)=w(d1,:)+alpha*(x(order(i),:)-w(d1,:));
    end
end
end
diff1(k)=norm(oldw-w);
diff=norm(oldw-w);
end

plot(w(:,1),w(:,2), 'r')
plot(w(:,1),w(:,2), 'ro')

%neighborhood (+-1)
w=rand(10,2);
k=0;
diff=10;
alpha=0.05;
while diff>0.01
    old=w; k=k+1;

    order=randperm(10);

    for i=1:10
        d=ones(10,1)*x(order(i),:)-w;
        d=(d(:,1).^2+d(:,2).^2).^.5;
        [m1 m2]=min(d);
        if m2==1;
            w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
            w(2,:)=w(2,:)+alpha*(x(order(i),:)-w(2,:));
            w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
        elseif m2==10;
            w(10,:)=w(10,:)+alpha*(x(order(i),:)-w(10,:));
            w(9,:)=w(9,:)+alpha*(x(order(i),:)-w(9,:));
            w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
        else
            for d1=m2-1:m2+1
```

Unsupervised Machine Learning

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```
w(1,:)=w(1,:)+alpha*(x(order(i),:)-w(1,:));
end
end
end
endif(k)=norm(oldw-w);
diff=norm(oldw-w);
end
plot(w(:,1),w(:,2),'g')
plot(w(:,1),w(:,2),'go')

% neighborhood (+-0) case
w = rand(10, 2);
alpha = 0.01;
k = 0;
diff = 10;

while diff > 0.0001
    oldw = w;
    k = k + 1;

    order = randperm(10);

    for i = 1:10
        d = ones(10, 1) * x(order(i), :) - w;
        d = (d(:, 1).^2 + d(:, 2).^2).^0.5;
        [~, m2] = min(d);

        if m2 == 1
            w(1,:) = w(1,:) + alpha * (x(order(i),:) - w(1,:));
        elseif m2 == 2
            w(2,:) = w(2,:) + alpha * (x(order(i),:) - w(2,:));
        elseif m2 == 3
            w(3,:) = w(3,:) + alpha * (x(order(i),:) - w(3,:));
        elseif m2 == 4
            w(4,:) = w(4,:) + alpha * (x(order(i),:) - w(4,:));
        elseif m2 == 5
            w(5,:) = w(5,:) + alpha * (x(order(i),:) - w(5,:));
        elseif m2 == 6
            w(6,:) = w(6,:) + alpha * (x(order(i),:) - w(6,:));
        elseif m2 == 7
            w(7,:) = w(7,:) + alpha * (x(order(i),:) - w(7,:));
        elseif m2 == 8
            w(8,:) = w(8,:) + alpha * (x(order(i),:) - w(8,:));
        elseif m2 == 9
            w(9,:) = w(9,:) + alpha * (x(order(i),:) - w(9,:));
        else
            w(10,:) = w(10,:) + alpha * (x(order(i),:) - w(10,:));
        end
    end
end
```

**Unsupervised Machine Learning
Assignment 7**

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```
diff = norm(oldw - w);  
end
```

```
plot(w(:,1),w(:,2),'b')  
plot(w(:,1),w(:,2),'bo')
```