ENTRY

In the previous unit, you have learned the spatial pattern and neighborhood of features based on the assumption that the space is homogeneous. Therefore, you can move throughout the space freely to any direction at the same amount of energy, time, cost etc.

In this unit, the space will be considered as heterogeneous space. There is friction to your movement. This friction can be translated as cost, energy, attractiveness, time etc.

Let's consider here, as the time is matter. If you are moving from town A to B through the highway, you use less time than through the footpath. The friction of highway is lower than the friction of footpath. This friction can be presented as weight. Higher the weight, you have more preference. Although the distance along the highway may be longer than the footpath, the time distance is shorter to move. Therefore highway will be given higher weight and footpath will be given lower weight in considering time of movement.

The weight value can be given to spatial objects based on the preference, cost, energy, time etc. In this unit you will learn weighted spatial patterns and neighborhood of point features, line features and areal features.

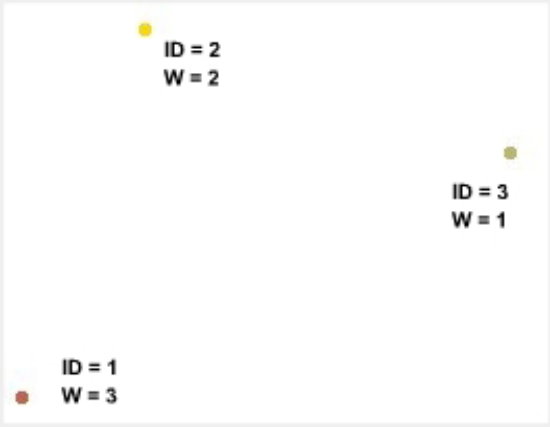
CLARIFICATION: Weighted spatial pattern and neighborhood of point features

Refer to the **introduction** section of PDF version of animation presentation or animation on the web page.
Refer to the **weighted spatial pattern and neighborhood of point features** section of PDF version of animation presentation or animation on the web page.

LOOK

Step by step illustration of minimum weighted distance surface based on point features

Step-1: Create point features or use point feature file



Purpose

1. To create minimum weighted distance surface

2. To allocate the area based on ID of each point and minimum weighted distance surface

File name = wpoint

Step-2: Createa feature file for each feature ID : feature1

Point feature file for ID 1 with a weight of 3.

File name = pointid1

Step-2: Createa feature file for each feature ID : feature2

Point feature file for
ID 2 with a weight of 2.

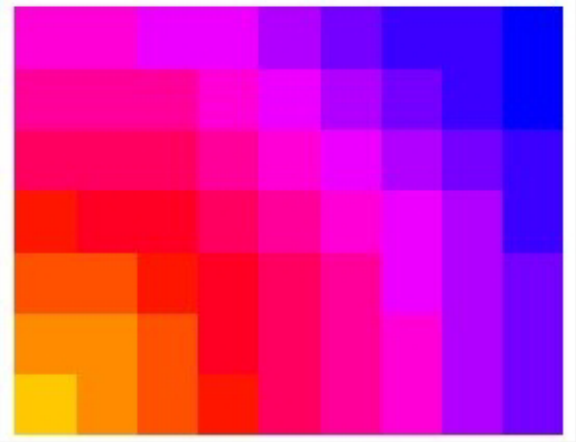
File name = pointid2

Step-2: Createa feature file for each feature ID: feature3

Point feature file for
ID 3 with a weight of 1.

File name = pointid3

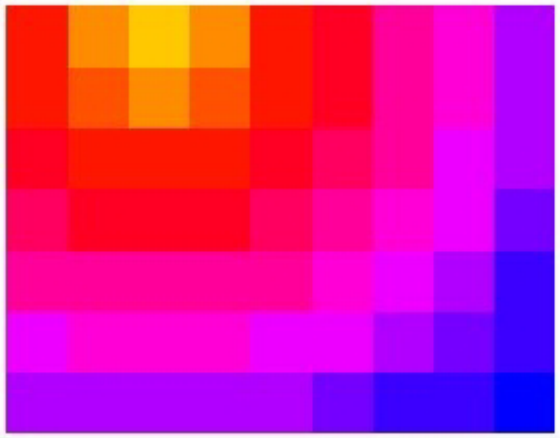
Step-3: Calculate the Euclidian Distance for each Feature ID : feature1



Euclidian distance from ID 1 at 0.5 m resolution.

File name = pointid1eu

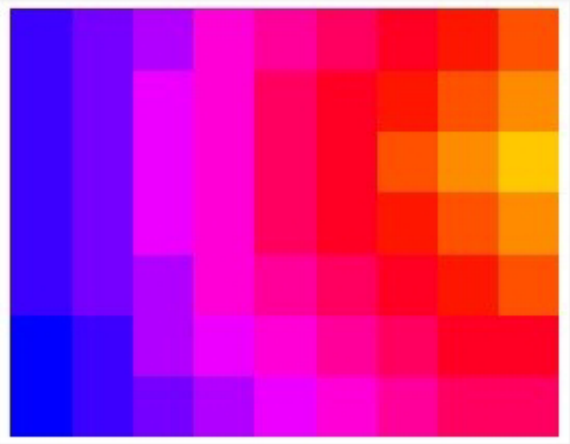
Step-3: Calculate the Euclidian Distance for each Feature ID : feature2

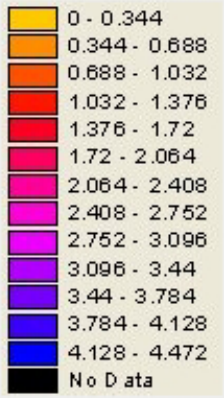


Euclidian distance from ID 2 at 0.5 m resolution.

File name = pointid2eu

Step-3: Calculate the Euclidian Distance for each Feature ID : feature3

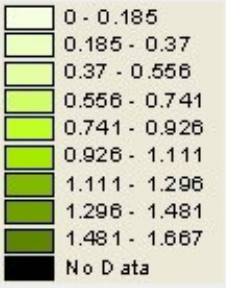




Euclidian distance from ID 3 at 0.5 m resolution.

File name = pointid3eu

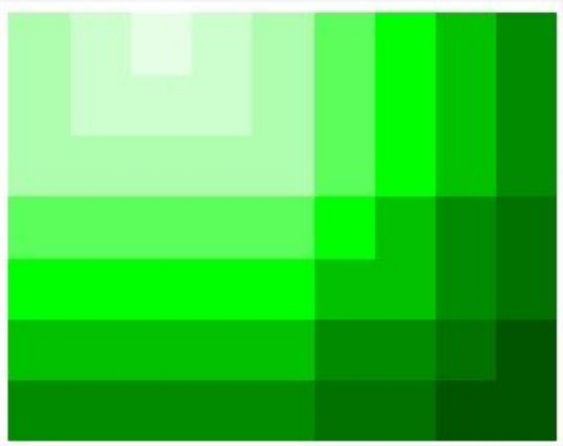
Step-4: Divide each euclidian distance surface grid by the weight : Surface1

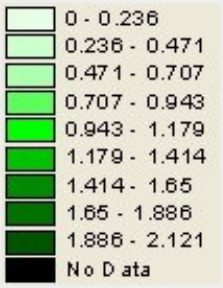


Euclidian distance surface of ID 1 is divided by weight value 3.

File name = pointid1eubyw3

Step-4: Divide each euclidian distance surface grid by the weight : Surface2

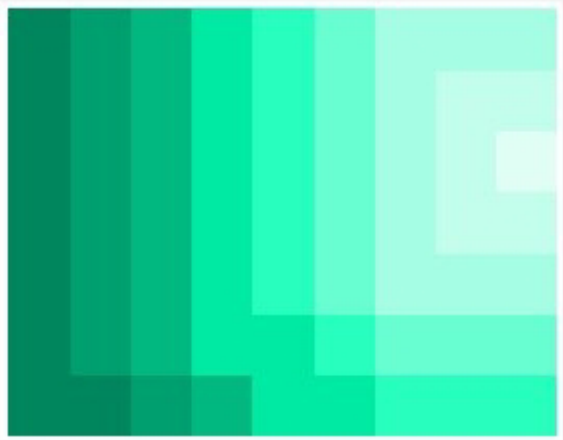




Euclidian distance surface of ID 2 is divided by weight value 2.

File name = pointid2eubyw2

Step-4: Divide each euclidian distance surface grid by the weight : Surface3

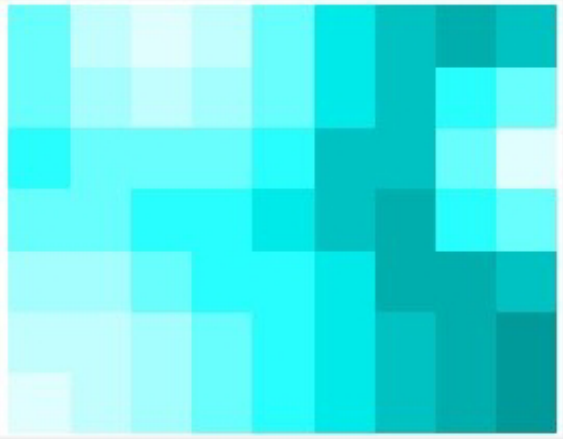


Euclidian distance surface of ID 3 is divided by weight value 1.

File name = pointid3eubyw1

Step-5: Create minimum weighted distance surface

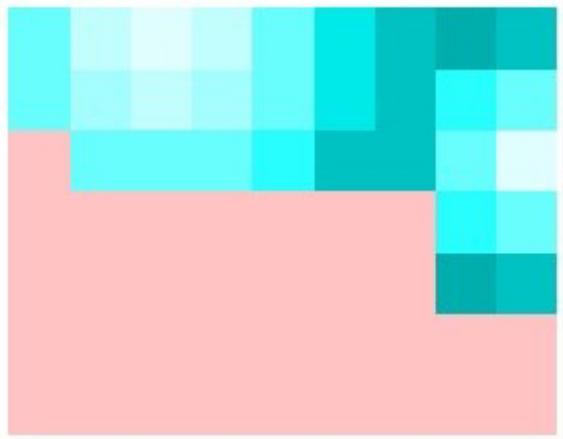
Create minimum weighted distance surface by finding and assigning minimum value based on each weighted surface : pointid1euby3, pointid2euby2, pointid3euby1



This is the result 1

Weighted minimum distance

Step-6: Create allocation map for each point based on weighted minimum distance



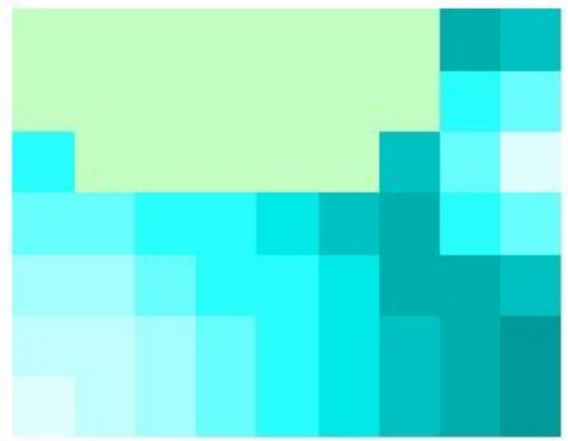
The pink color cells or zone illustrates the spatial extent influenced by point id 1 with weight value 3.

All the pink color cells are assigned to 1 to indicate these are influenced by polygon id 1.

Background image is weighted minimum distance surface.

File name = zone1

Step-6: Create allocation map for each point based on weighted minimum distance



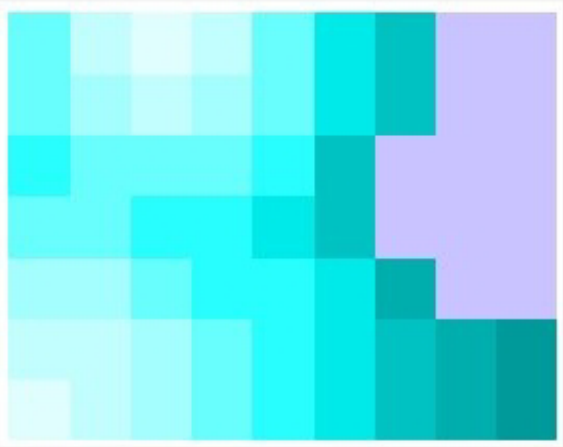
The light green color cells or zone illustrates the spatial extent influenced by point id 2 with weight value 2.

All the light green color cells are assigned to 2 to indicate these are influenced by point id 2.

Background image is weighted minimum distance surface.

File name = zone2

Step-6: Create allocation map for each point based on weighted minimum distance

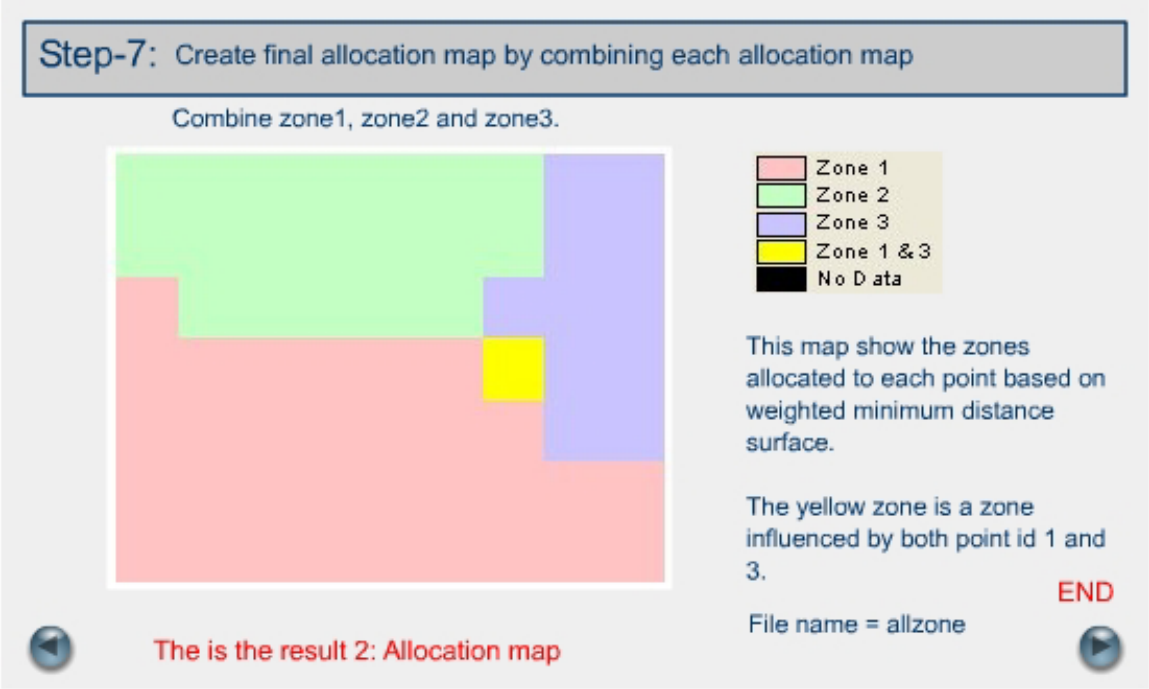


The light violet color cells or zone illustrates the spatial extent influenced by point id 3 with weight value 1.

All the light violet color cells are assigned to 3 to indicate these are influenced by point id 3.

Background image is weighted minimum distance surface.

File name = zone3



ACT

Create a weighted minimum distance based on the following point dataset. Minimum x and y is zero. Maximum x and y is 10. Select the resolution 1 meter or 0.5 meter, according to your choice.

Point	X (m)	Y(m)	Weight
A (id = 1)	2	2	3
B (id = 2)	3	5	2
C (id = 3)	6	4	1

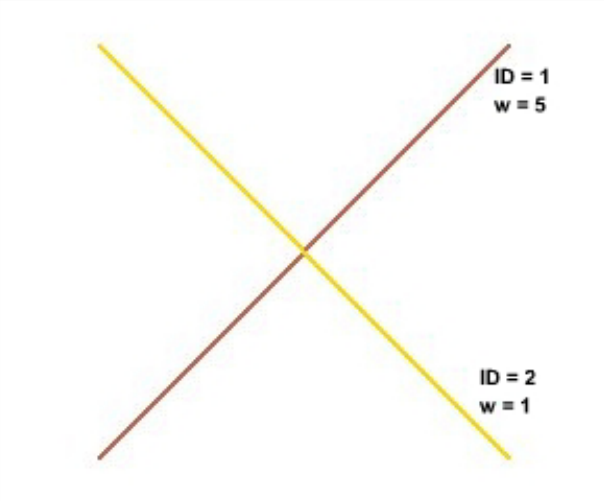
CLARIFICATION: Weighted spatial pattern and neighborhood of linear features

Refer to the **weighted neighborhood of line features** section of PDF version of animation presentation **or** animation on the web page.

LOOK

Step by step illustration of minimum weighted distance surface based on linear features

Step-1: Create line features or use line feature file



Purpose

1. To create minimum weighted distance surface

2. To allocate the area based on ID of each line and minimum weighted distance surface

File name = wline

Step-2: Createa feature file for each feature ID : feature1

Line feature file for ID 1 with a weight of 5.

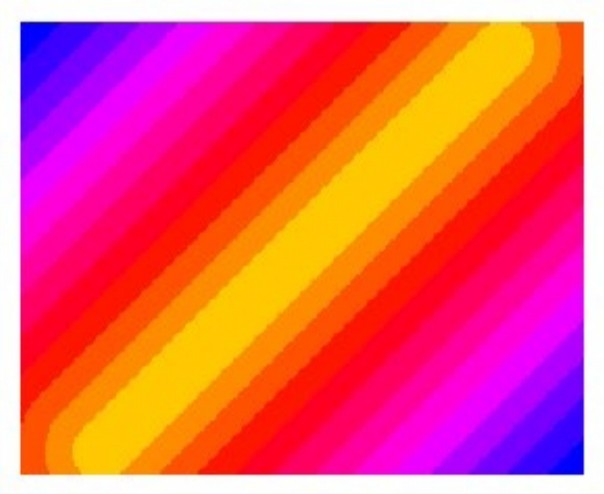
File name = lineid1

Step-2: Createa feature file for each feature ID : feature2

Line feature file for
ID 2 with a weight of 1.

File name = lineid2

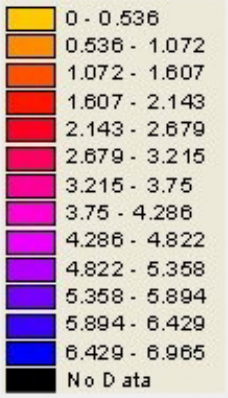
Step-3: Calculate the Euclidian Distance for each Feature ID : feature1



Euclidian distance from
ID 1 at 0.05 m resolution.

File name = lineid1eu

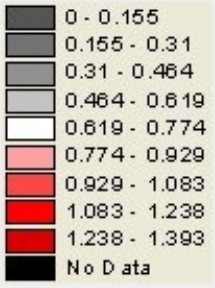
Step-3: Calculate the Euclidian Distance for each Feature ID : feature2



Euclidian distance from ID 2 at 0.05 m resolution.

File name = lineid2eu

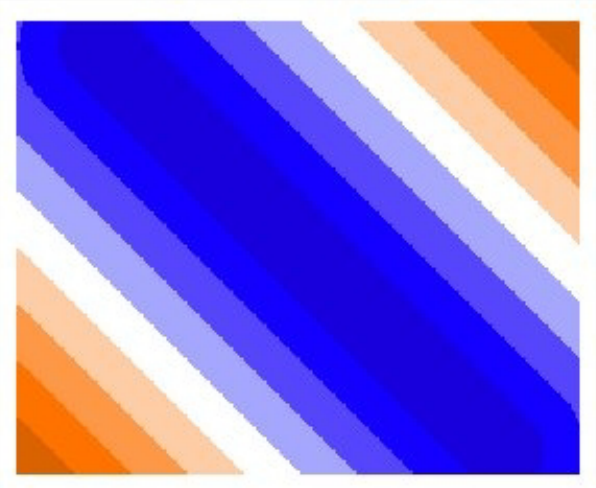
Step-4: Divide each euclidian distance surface grid by the weight : Surface1



Euclidian distance surface of ID 1 is divided by weight value 5.

File name = lineid1eubyw5

Step-4: Divide each euclidian distance surface grid by the weight : Surface2

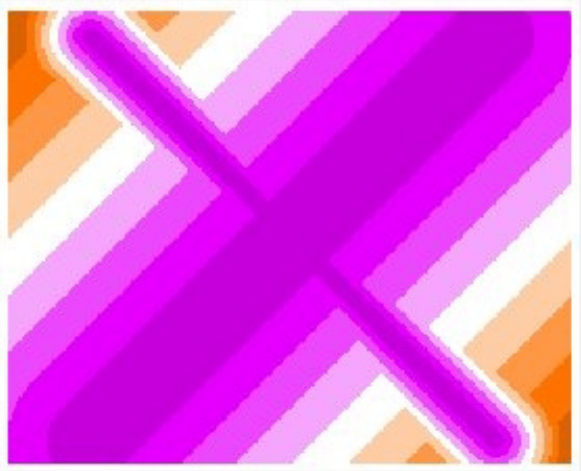


Euclidian distance surface of ID 2 is divided by weight value 1.

File name = lineid2eubyw1

Step-5: Create minimum weighted distance surface

Create minimum weighted distance surface by finding and assigning minimum value based on each weighted surface : lineid1euby5, lineid2euby1



This is the result 1

Weighted minimum distance

Step-6: Create allocation map for each line based on weighted minimum distance

The pink color cells or zone illustrates the spatial extent influenced by line id 1 with weight value 5.

All the pink color cells are assigned to 1 to indicate these are influenced by line id 1.

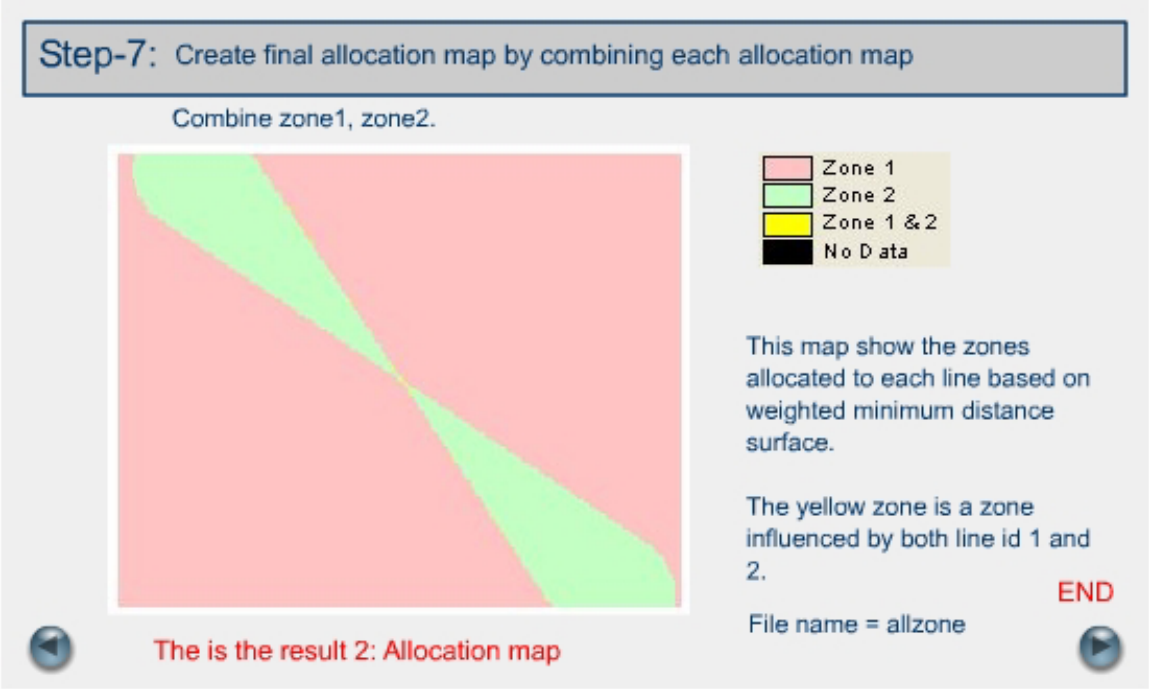
File name = zone1

Step-6: Create allocation map for each line based on weighted minimum distance

The light green color cells or zone illustrates the spatial extent influenced by line id 2 with weight value 1.

All the light green color cells are assigned to 2 to indicate these are influenced by line id 2.

File name = zone2



ACT

Create a weighted minimum distance surface based on the following dataset. Minimum x and y is zero. Maximum x and y is 10. Select the resolution 1 meter to 0.05 meter, according to your choice.

Road	From	To	Weight
A (id = 1)	1,1	9,9	5
B (id = 2)	9,1	1,9	1

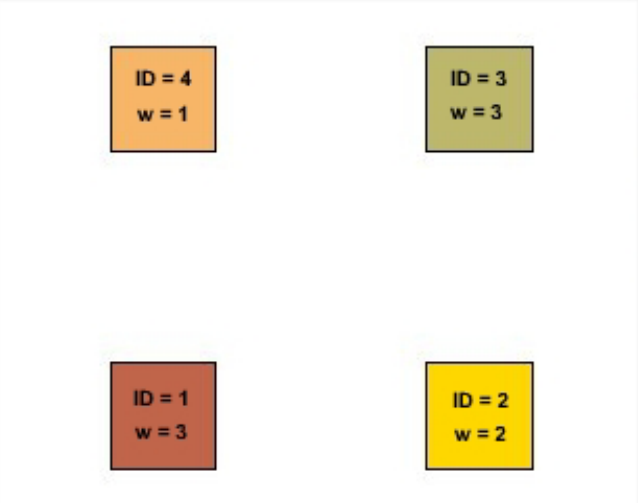
CLARIFICATION: Weighted spatial pattern and neighborhood of areal features

Refer to the **weighted neighborhood of areal features** section of PDF version of animation presentation **or** animation on the web page.

LOOK

Step by step illustration of minimum weighted distance surface based on areal features

Step-1: Create polygon features or use polygon feature file



Purpose

1. To create minimum weighted distance surface

2. To allocate the area based on ID of each polygon and minimum weighted distance surface

File name = wpoly

Step-2: Createa feature file for each feature ID : feature1

Polygon feature file for ID 1 with a weight of 3.

File name = polyid1

Step-2: Createa feature file for each feature ID : feature2

Polygon feature file for ID 2 with a weight of 2.

File name = polyid2

Step-2: Createa feature file for each feature ID : feature3

Polygon feature file for ID 3 with a weight of 3.

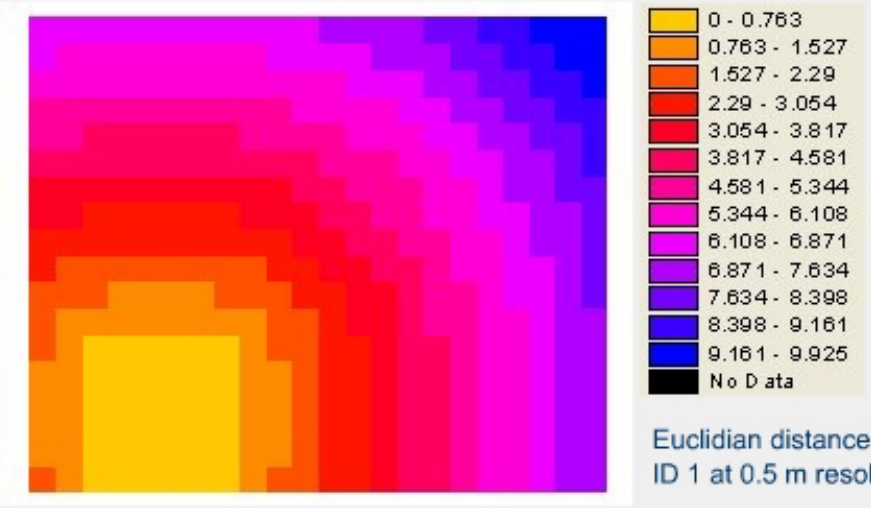
File name = polyid3

Step-2: Createa feature file for each feature ID : feature4

Polygon feature file for ID 4 with a weight of 1.

File name = polyid4

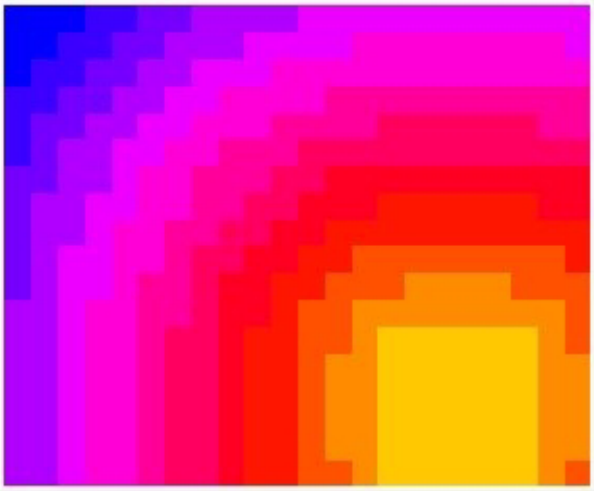
Step-3: Calculate the Euclidian Distance for each Feature ID : feature1

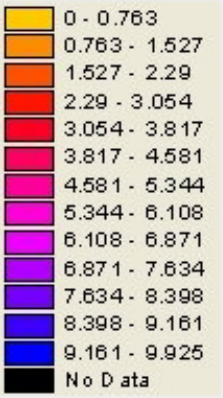


Euclidian distance from ID 1 at 0.5 m resolution.

File name = polyid1eu

Step-3: Calculate the Euclidian Distance for each Feature ID : feature2

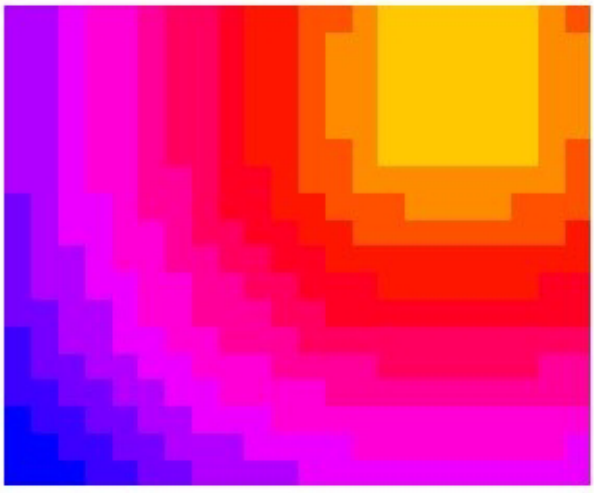


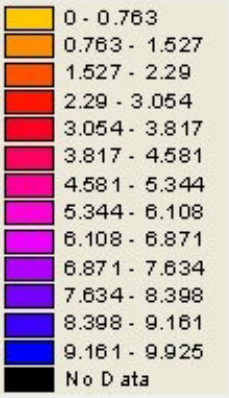


Euclidian distance from ID 2 at 0.5 m resolution.

File name = polyid2eu

Step-3: Calculate the Euclidian Distance for each Feature ID : feature3

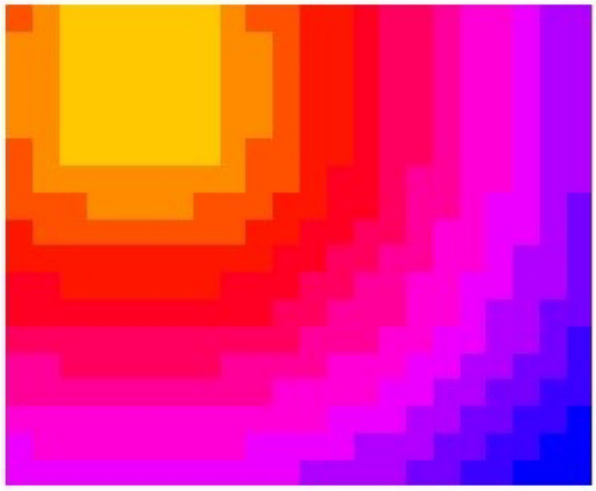




Euclidian distance from ID 3 at 0.5 m resolution.

File name = polyid3eu

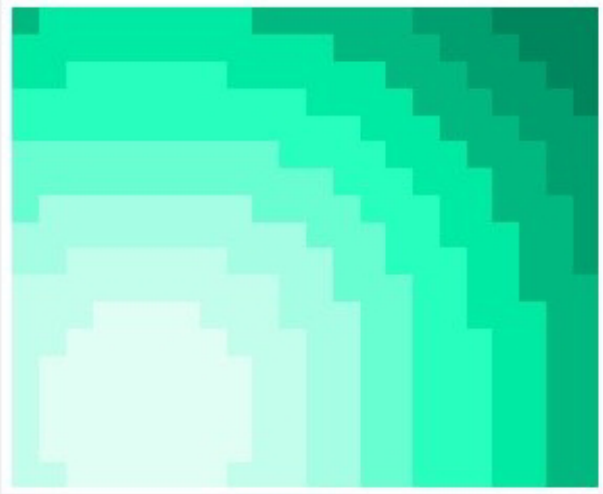
Step-3: Calculate the Euclidian Distance for each Feature ID : feature4

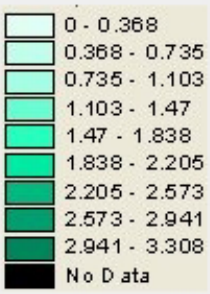


Euclidian distance from ID 4 at 0.5 m resolution.

File name = polyid4eu

Step-4: Divide each euclidian distance surface grid by the weight : Surface1

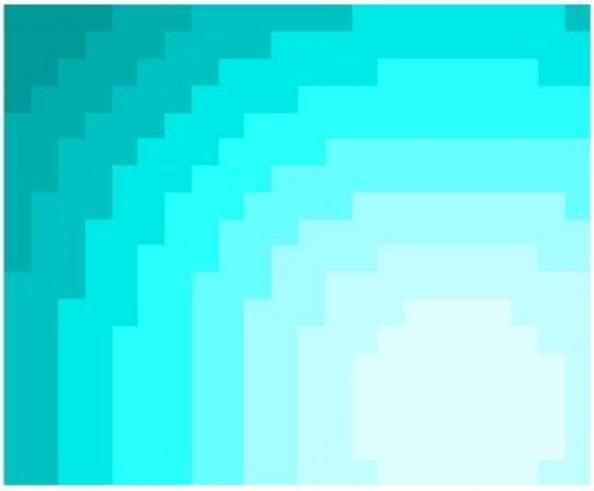




Euclidian distance surface of ID 1 is divided by weight value 3.

File name = polyid1eubyw3

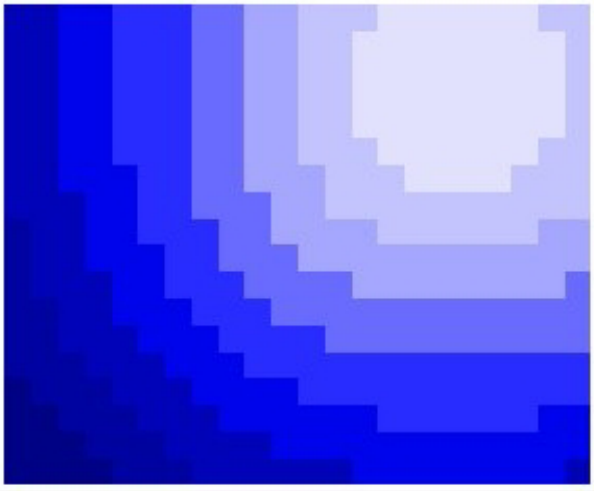
Step-4: Divide each euclidian distance surface grid by the weight : Surface2



Euclidian distance surface of ID 2 is divided by weight value 2.

File name = polyid2eubyw2

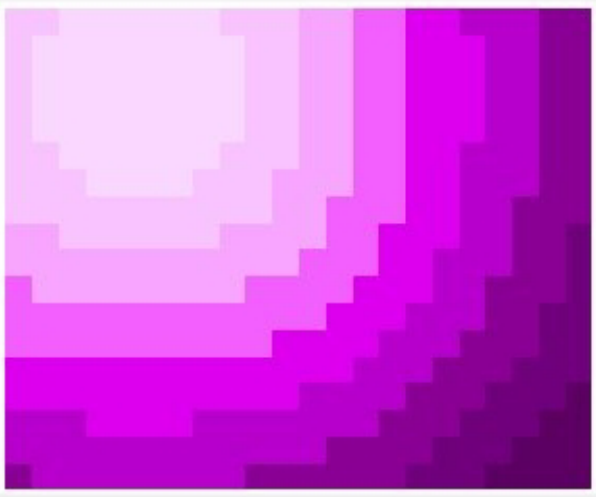
Step-4: Divide each euclidian distance surface grid by the weight : Surface3



Euclidian distance surface of ID 3 is divided by weight value 3.

File name = polyid3eubyw3

Step-4: Divide each euclidian distance surface grid by the weight : Surface4

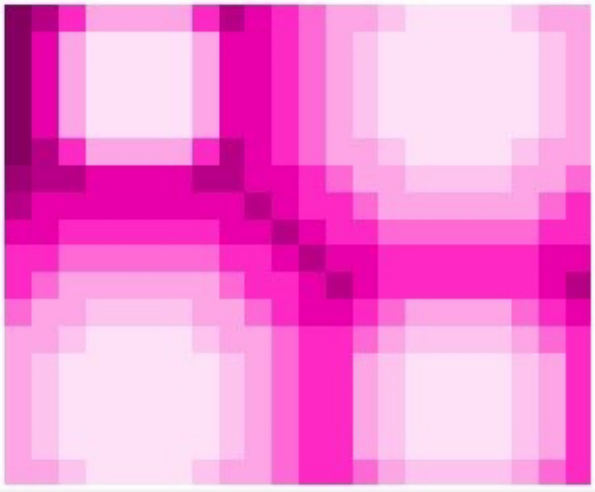


Euclidian distance surface of ID 4 is divided by weight value 1.

File name = polyid4eubyw1

Step-5: Create minimum weighted distance surface

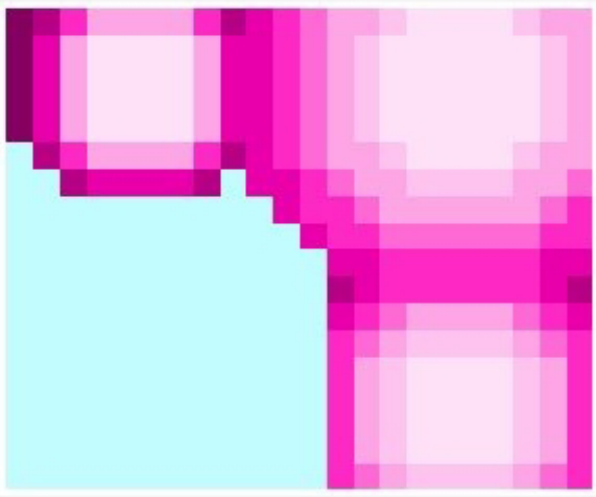
Create minimum weighted distance surface by finding and assigning minimum value based on each weighted surface : polyid1euby3, polyid2euby2, polyid3euby3, polyid4euby1



This is the result 1

Weighted minimum distance

Step-6: Create allocation map for each polygon based on weighted minimum distance



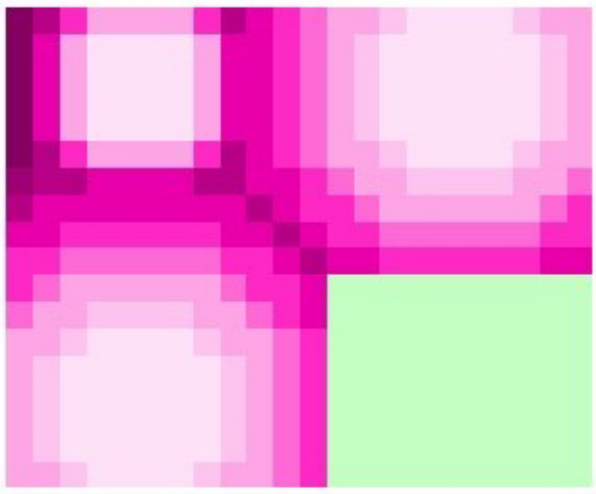
The cyan color cells or zone illustrates the spatial extent influenced by polygon id 1 with weight value 3.

All the cyan color cells are assigned to 1 to indicate these are influenced by polygon id 1.

Background image is weighted minimum distance surface.

File name = zone1

Step-6: Create allocation map for each polygon based on weighted minimum distance



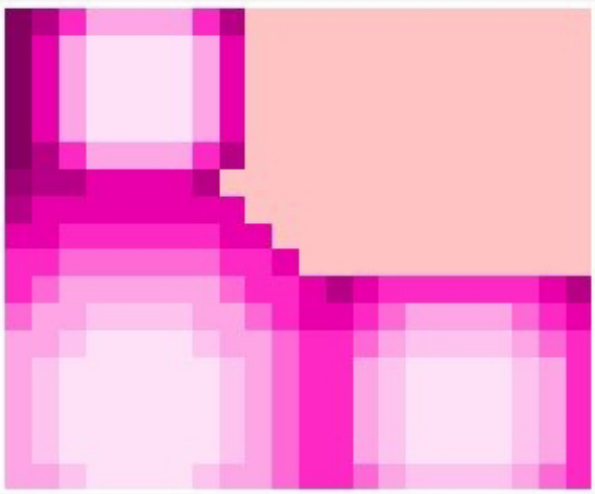
The light green color cells or zone illustrates the spatial extent influenced by polygon id 2 with weight value 2.

All the light green color cells are assigned to 2 to indicate these are influenced by polygon id 2.

Background image is weighted minimum distance surface.

File name = zone2

Step-6: Create allocation map for each polygon based on weighted minimum distance



0
3
No Data

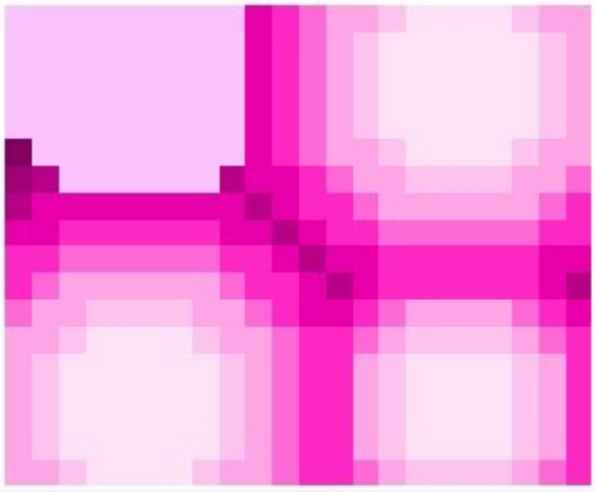
The light pink color cells or zone illustrates the spatial extent influenced by polygon id 3 with weight value 3.

All the light pink color cells are assigned to 3 to indicate these are influenced by polygon id 3.

Background image is weighted minimum distance surface.

File name = zone3

Step-6: Create allocation map for each polygon based on weighted minimum distance



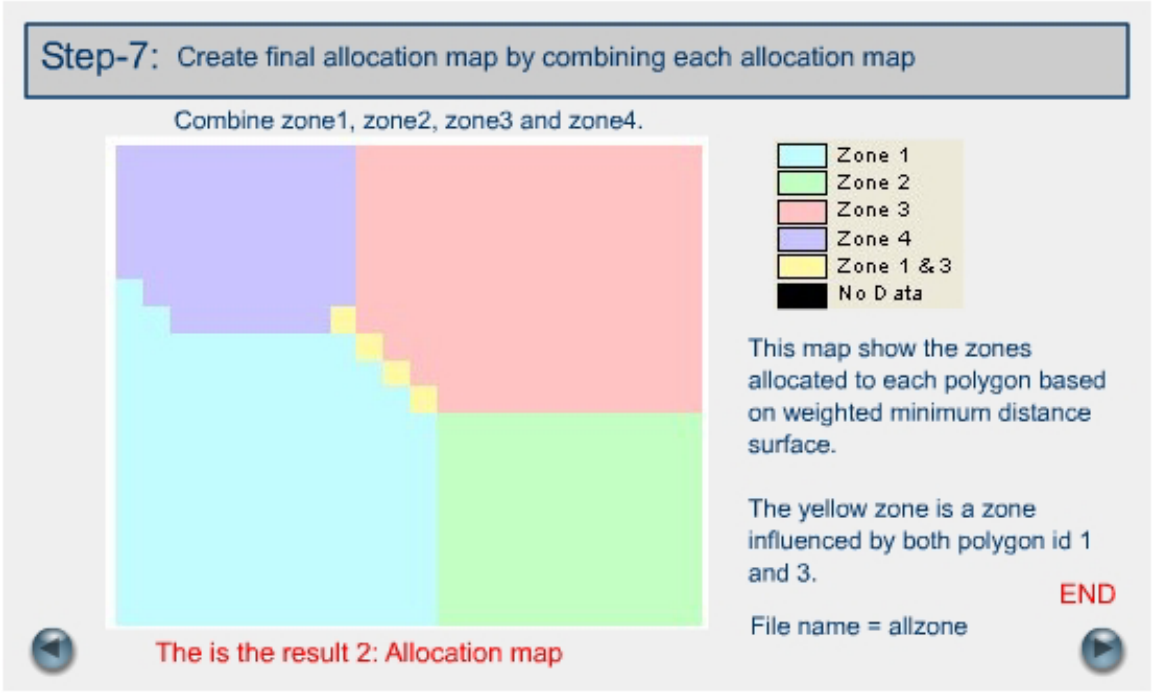
0
4
No Data

The light violet color cells or zone illustrates the spatial extent influenced by polygon id 4 with weight value 1.

All the light violet color cells are assigned to 4 to indicate these are influenced by polygon id 4.

Background image is weighted minimum distance surface.

File name = zone4



ACT

Create minimum weighted distance surface based on the following polygon feature. The list of vertices foe each polygon is provided. Minimum x and y is zero. Maximum x and y is 10. Select the resolution 1 meter or 0.5 meter, according to your choice.

Polygon	List of vertices	Weight
A (id = 1)	1,1; 3,1; 3,3; 1,3; 1,1	3
B (id = 2)	7,1; 9,1; 9,3; 7,3; 7,1	2
C (id = 3)	7,7; 9,7; 9,9; 7,9; 7,7	3
D (id = 4)	1,7; 3,7; 3,9; 1,9; 1,7	1

Questions

1.Refer to the Step-4 of step-by-step illustration on minimum weighted distance surface presentation for point or line or polygon features above. Why Euclidian surface is divided by the weight value?

2. Refer to the Step-5 of step-by-step illustration on minimum weighted distance surface presentation for point or line or polygon features above. What is your strategy or concept to derive minimum weighted distance value based on weighted distance surfaces of each feature ID. How do you implement your concept in your GIS system? Describe detail steps of implementation in your GIS System.

3. Refer to the Step-6 of step-by-step illustration on minimum weighted distance surface presentation for point or line or polygon features above. What is your strategy or concept to find out the influenced zone by each feature id based on minimum weighted surface? How do you

implement your concept in your GIS system? Describe detail steps of implementation in your GIS System.

4. Refer to the Step-7 of step-by-step illustration on minimum weighted distance surface presentation for point or line or polygon features above. How to combine each zone in order to produce a map that shows all the zones? How do you find out zone, which is influenced by more than one zone? How do you implement your concept in your GIS system? Describe detail steps of implementation in your GIS System.

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Submit your answer to the instructor through email.

Post your answer to the discussion board.