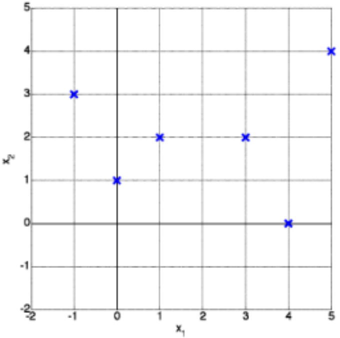
Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin **initialise** c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, $i = 1, 2, \ldots, n$
  do $\hat{c} = \hat{c} - 1$
    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$
  until $c = \hat{c}$
  return c clusters
end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 1

- $n = 6$
- $c = 3$
- $\hat{c} = n = 6$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1\}$, $\mathscr{D}_2 \leftarrow \{\mathbf{x}_2\}$, $\mathscr{D}_3 \leftarrow \{\mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

Example (using Group-average clustering as distance measure)

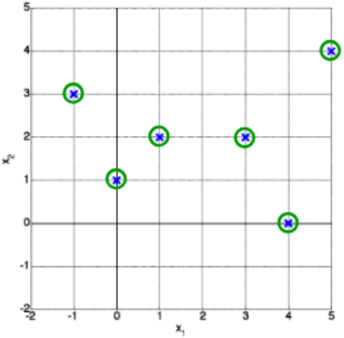
$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, $i = 1, 2, \ldots, n$
- **do** $\hat{c} = \hat{c} - 1$
  - Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$
  - Merge $\mathscr{D}_i$ and $\mathscr{D}_j$
- **until** $c = \hat{c}$
- **return** c clusters

end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 1

- $n = 6$
- $c = 3$
- $\hat{c} = n = 6$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1\}$, $\mathscr{D}_2 \leftarrow \{\mathbf{x}_2\}$, $\mathscr{D}_3 \leftarrow \{\mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, $i = 1, 2, \ldots, n$

  do $\hat{c} = \hat{c} - 1$

    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$

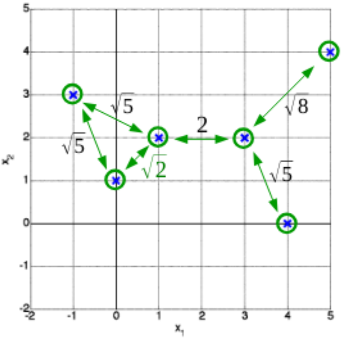
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$

  until $c = \hat{c}$

  return c clusters

end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 1

- $n = 6$
- $c = 3$
- $\hat{c} = \hat{c} - 1 = 6 - 1 = 5$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1\}$, $\mathscr{D}_2 \leftarrow \{\mathbf{x}_2\}$, $\mathscr{D}_3 \leftarrow \{\mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, i = 1, 2, ..., n

  do $\hat{c} = \hat{c} - 1$

    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$

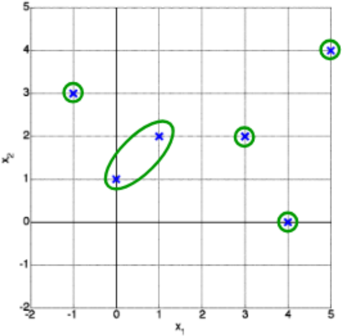
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$

  until $c = \hat{c}$

  return c clusters

end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 1

- $n = 6$
- $c = 3$
- $\hat{c} = 5$
- Merge $\mathscr{D}_2$ and $\mathscr{D}_3$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1\}$, $\mathscr{D}_2 \leftarrow \{\mathbf{x}_2, \mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, $i = 1, 2, \ldots, n$

  do $\hat{c} = \hat{c} - 1$

    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$

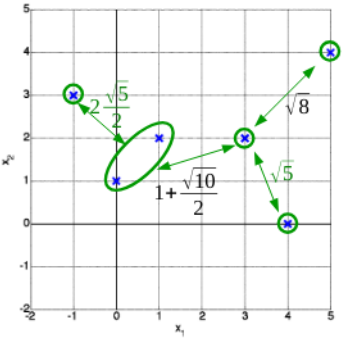
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$

  until $c = \hat{c}$

  return c clusters

end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 2

- $n = 6$
- $c = 3$
- $\hat{c} = \hat{c} - 1 = 5 - 1 = 4$
- Merge $\mathscr{D}_1$ and $\mathscr{D}_2$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

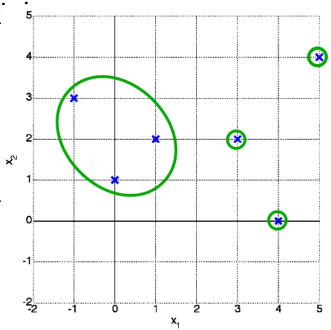
Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clus

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, i = 1, 2, ..., n
  do $\hat{c} = \hat{c} - 1$
    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$
  until $c = \hat{c}$
  return c clusters
end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 2

- $n = 6$
- $c = 3$
- $\hat{c} = 4$
- Merge $\mathscr{D}_1$ and $\mathscr{D}_2$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

KING'S College LONDON University of London

Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clu

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, i = 1, 2, . . ., n

  do $\hat{c} = \hat{c} - 1$

    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$

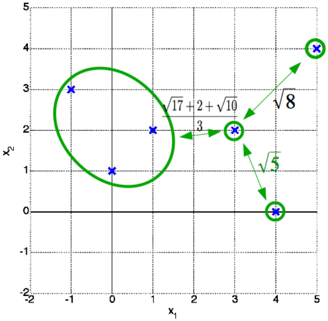
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$

  until $c = \hat{c}$

  return c clusters

end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 3

- $n = 6$
- $c = 3$
- $\hat{c} = \hat{c} - 1 = 4 - 1 = 3$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$, $\mathscr{D}_6 \leftarrow \{\mathbf{x}_6\}$

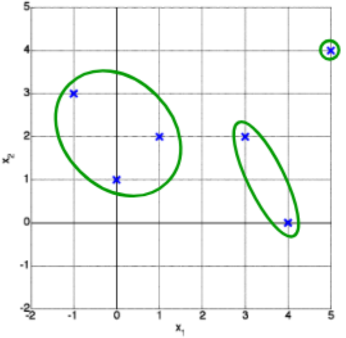
Example (using Group-average clustering as distance measure)

$$S = \{\underbrace{(-1,3)}_{\mathbf{x}_1}, \underbrace{(1,2)}_{\mathbf{x}_2}, \underbrace{(0,1)}_{\mathbf{x}_3}, \underbrace{(4,0)}_{\mathbf{x}_4}, \underbrace{(5,4)}_{\mathbf{x}_5}, \underbrace{(3,2)}_{\mathbf{x}_6}\}$$

Pseudo Code: Algorithm for Agglomerative hierarchical clustering

begin initialise c, $\hat{c} \leftarrow n$, $\mathscr{D}_i \leftarrow \{\mathbf{x}_i\}$, $i = 1, 2, \ldots, n$
  do $\hat{c} = \hat{c} - 1$
    Find the nearest clusters, say, $\mathscr{D}_i$ and $\mathscr{D}_j$
    Merge $\mathscr{D}_i$ and $\mathscr{D}_j$
  until $c = \hat{c}$
  return c clusters
end

c: target number of clusters; $\hat{c}$: current number of clusters.



Iteration 3

- $n = 6$
- $c = 3$
- $\hat{c} = \hat{c} - 1 = 4 - 1 = 3$
- Merge $\mathscr{D}_4$ and $\mathscr{D}_6$
- $\mathscr{D}_1 \leftarrow \{\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3\}$, $\mathscr{D}_4 \leftarrow \{\mathbf{x}_4, \mathbf{x}_6\}$, $\mathscr{D}_5 \leftarrow \{\mathbf{x}_5\}$

Algorithm terminates (as $c = \hat{c} = 3$).