

#### **Data Mining Tutorial**

### Aufgabe 7-1 $\varepsilon = 1.1$ minPts= 2

minPts= 5

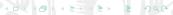
 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2

# **Data Mining Tutorial** Clusteranalyse - DBSCAN

Ludwig-Maximilians-Universität München

21. und 22.12.17 — KDD Übung





**Data Mining Tutorial** 

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

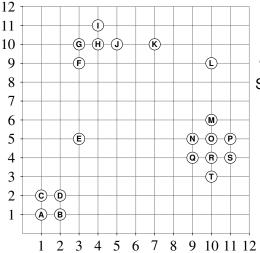
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 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



Data Mining Tutorial

Aufgabe 7-1

Aulyabe /

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

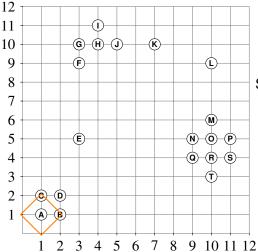
minPts=

 $\varepsilon = 4.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

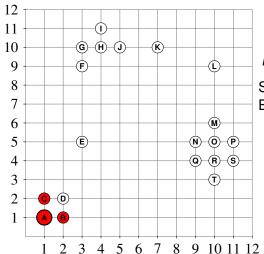
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

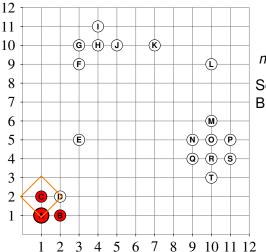
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 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

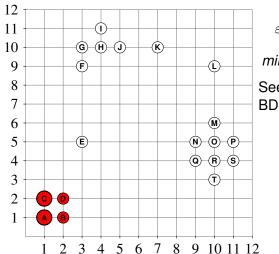
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minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





Data Mining Tutorial

Aufgabe 7-1

Aulyabe /

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 $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

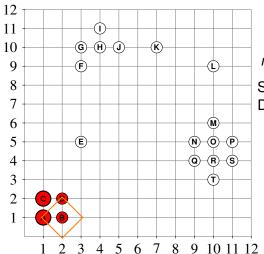
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minPts= 5

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list:

D



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

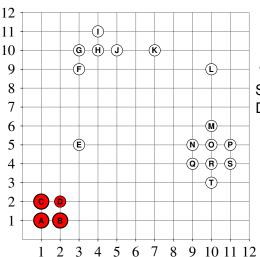
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list:

D



#### **Data Mining Tutorial**

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

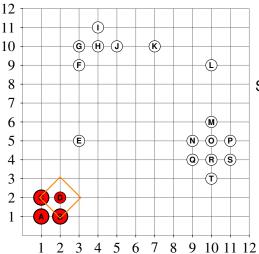
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 $\varepsilon = 4.1$ minPts= 5

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minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

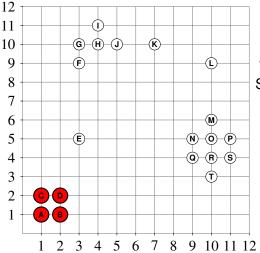
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 $\varepsilon = 4.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

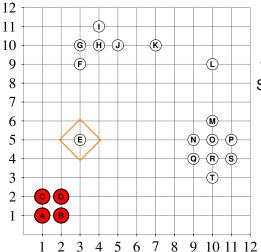
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 2



Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7

 $\varepsilon = 1.1$ minPts= 2

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minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

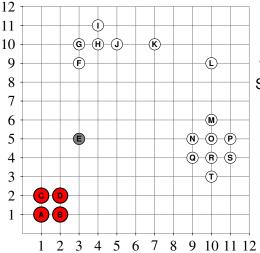
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Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 2



**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

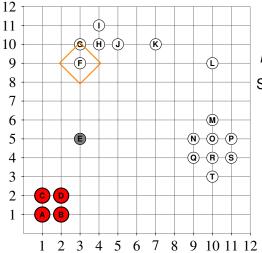
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Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

Aufgabe 7-1

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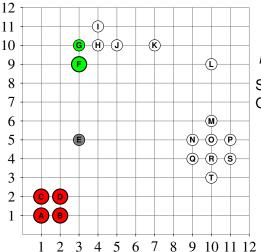
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list:

G



#### **Data Mining Tutorial**

Aufgabe 7-1

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minPts= 4

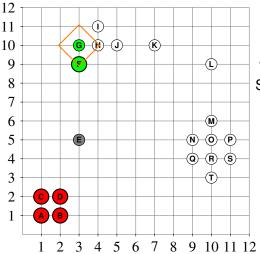
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 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

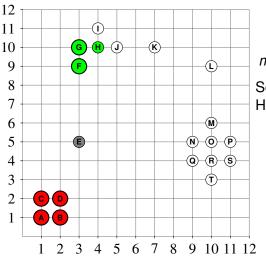
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Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





**Data Mining Tutorial** 

Aufgabe 7-1

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minPts= 4

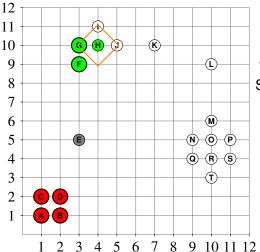
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minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

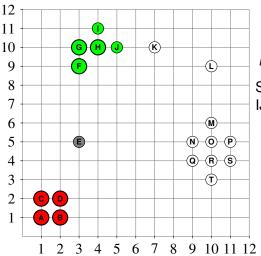
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Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 2

Seed list:

IJ



**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

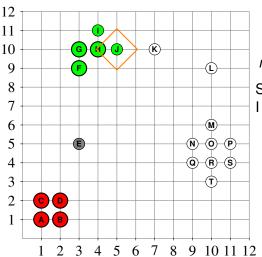
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



 $\varepsilon = 1.1$ 

minPts = 2



#### **Data Mining Tutorial**

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

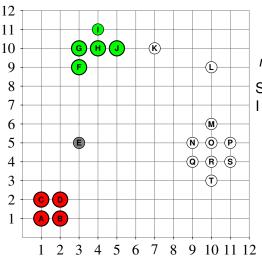
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Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

minPts= 4

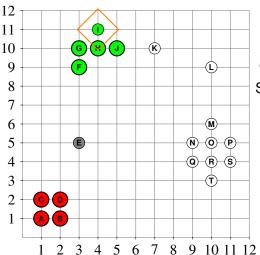
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minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

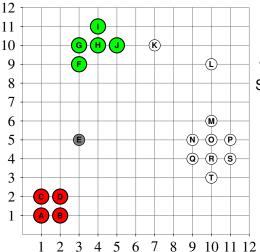
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### Data Mining Tutorial

Aufgabe 7-1

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minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1$ .

minPts= 4  $\varepsilon = 2.1$ 

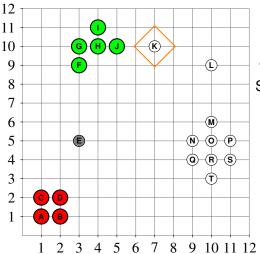
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 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### Data Mining Tutorial

Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

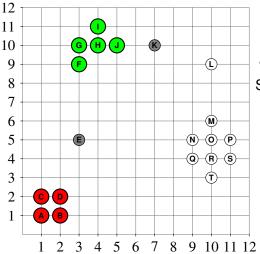
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minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



**Data Mining Tutorial** 

Aufgabe 7-1

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 $\varepsilon = 1.1$ 

minPts= 3

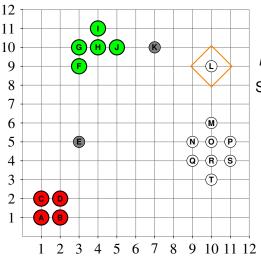
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 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 2



#### **Data Mining Tutorial**

Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

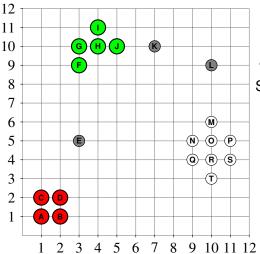
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

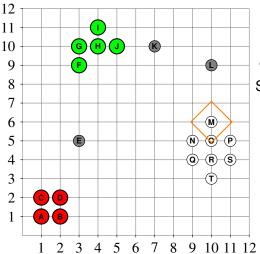
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minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

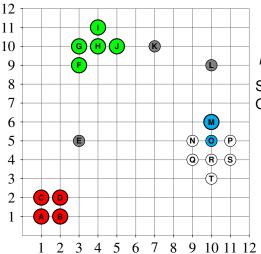
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 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list:

0



**Data Mining** Tutorial

Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

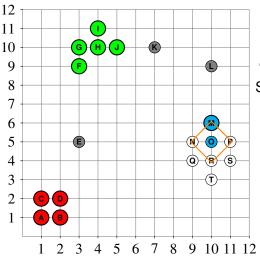
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### **Data Mining Tutorial**

#### Aufgabe 7-1

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 $\varepsilon = 1.1$ minPts= 3

minPts= 4

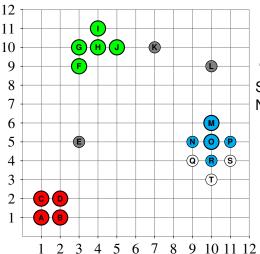
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minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list: **NPR**



#### Data Mining Tutorial

#### Aufgabe 7-1

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minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

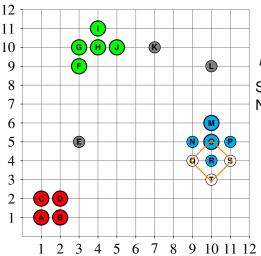
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 $\varepsilon = 2.1$ minPts=

minPts=  $\epsilon$  = 4.1

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7-

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 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

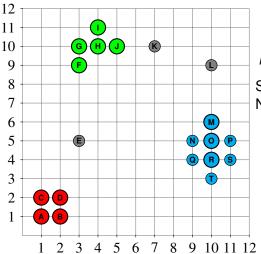
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minPts=

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



 $\varepsilon = 1.1$ 

minPts = 2

Seed list: NPQST



#### Data Mining Tutorial

#### Aufgabe 7-1

Aulyabe 7-

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 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

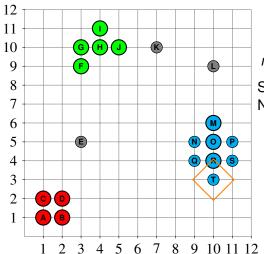
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minPts= 5

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list: NPQS



#### Data Mining Tutorial

#### Aufgabe 7-1

Aulyabe 7-

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 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

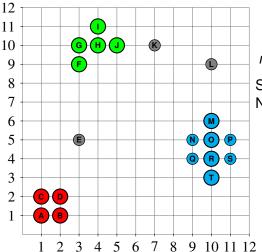
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Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list: NPQS



#### Data Mining Tutorial

#### Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

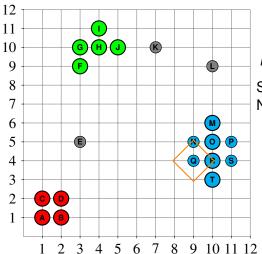
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minPts=  $\epsilon$ 

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list: NPS



#### Data Mining Tutorial

#### Aufgabe 7-1

Aulyabe 7-

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 $\varepsilon = 1.1$ minPts= 3

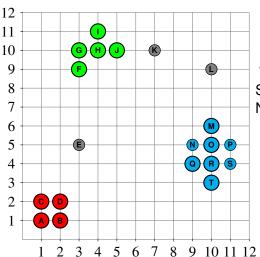
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minPts=  $\epsilon$  = 4.1

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

### Seed list: NPS



#### **Data Mining Tutorial**

#### Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

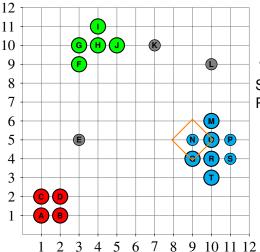
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 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7-

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 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

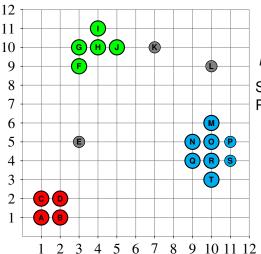
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minPts=  $\epsilon$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

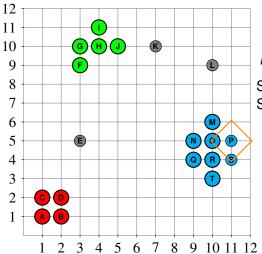
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 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

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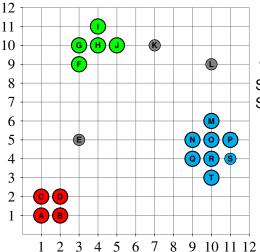
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 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4





$$\varepsilon = 1.1$$

$$minPts = 2$$





#### Data Mining Tutorial

#### Aufgabe 7-1

Aulgabe 7-

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts=  $\varepsilon = 1$ 

minPts= 4

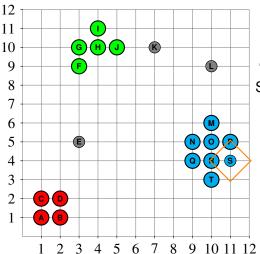
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minPts=  $\epsilon$ 

minPts= 5

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



**Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

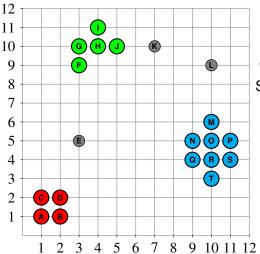
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$



Data Mining Tutorial

Aufgabe 7-1

Aulyabe 7

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts=

minPts= 4

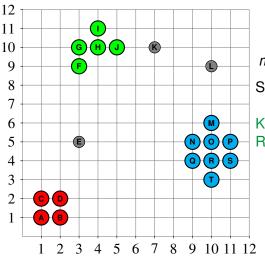
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minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 2$$

#### Seed list:

### Keine Randpunkte!



**Data Mining Tutorial** 

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

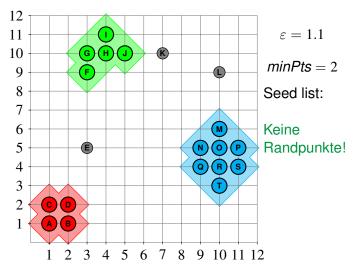
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2





Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

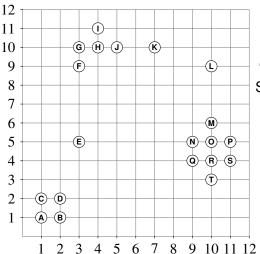
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 $\begin{array}{l} \text{minPts} = \ 4 \\ \varepsilon = 2.1 \\ \text{minPts} = \ 4 \end{array}$ 

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

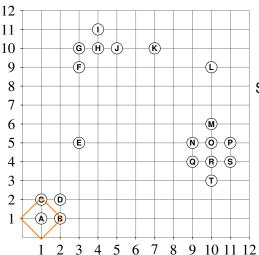
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

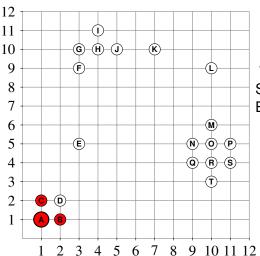
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 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

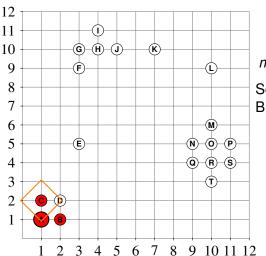
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

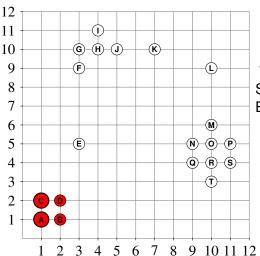
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

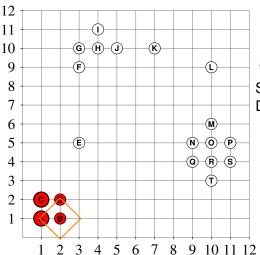
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list:

D D





#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

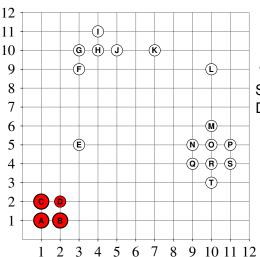
minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list:

D





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

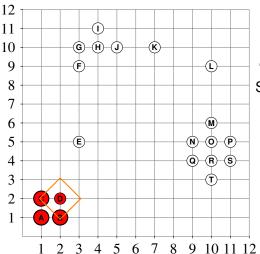
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 3



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

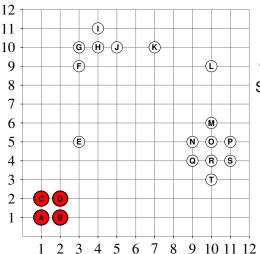
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

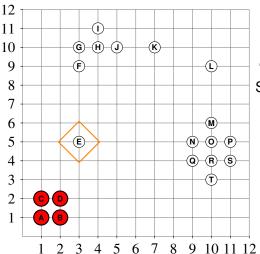
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

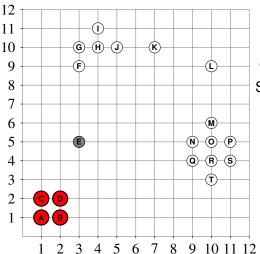
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$  minPts= 3

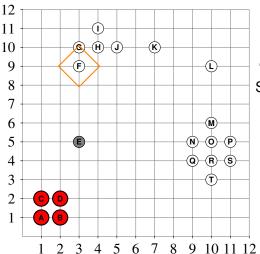
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

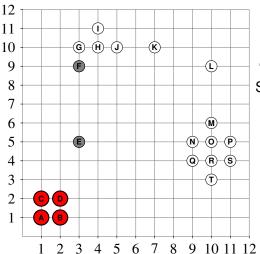
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minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

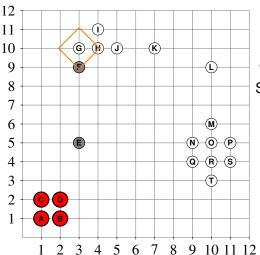
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

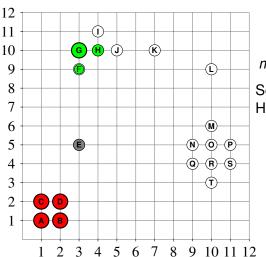
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

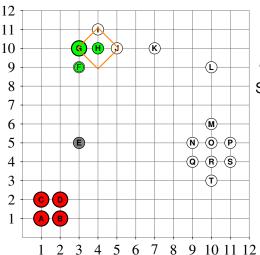
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minPts = 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

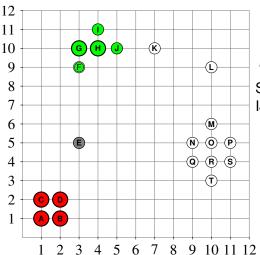
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

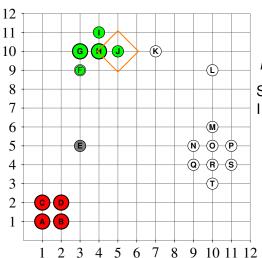
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list:

I



**Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

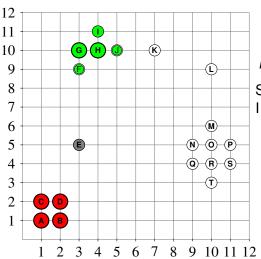
minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1 \text{ minPts} = 2$ 

 $\varepsilon = 1.1$ 

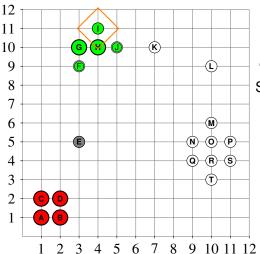
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1 \text{ minPts} = 2$ 

 $\varepsilon = 1.1$ minPts= 3

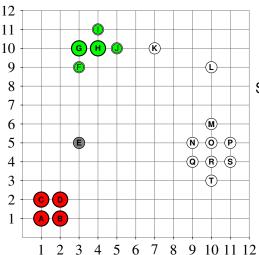
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$  minPts= 3

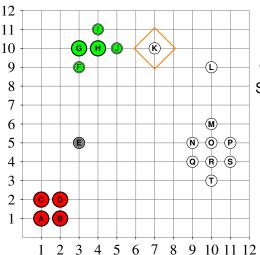
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

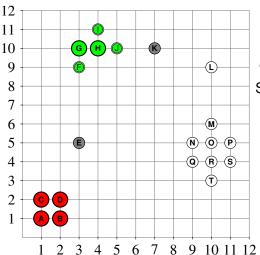
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

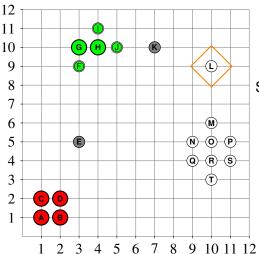
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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1 \text{ minPts} = 2$ 

 $\varepsilon = 1.1$ minPts= 3

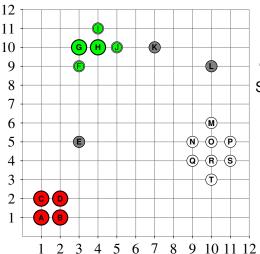
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

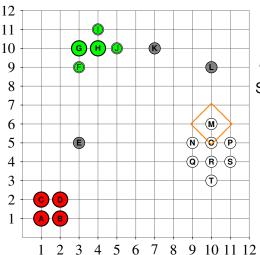
minPts= 3

minPts = 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1 \text{ minPts} = 2$ 

 $\varepsilon = 1.1$ minPts= 3

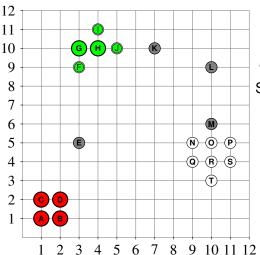
minPts=

 $\begin{array}{l} \text{minPts} = 4 \\ \varepsilon = 2.1 \\ \text{minPts} = 4 \end{array}$ 

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



**Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

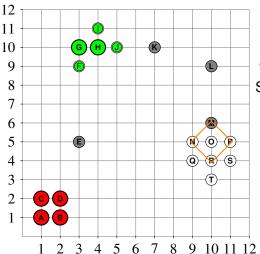
 $\varepsilon = 1.1$ minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

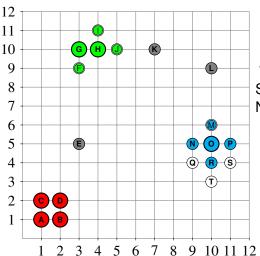
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list: NPR



**Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

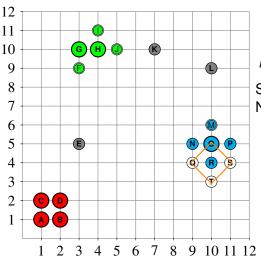
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

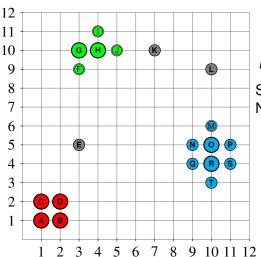
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list: NPQST



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

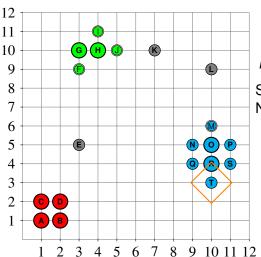
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

Seed list: NPQS



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

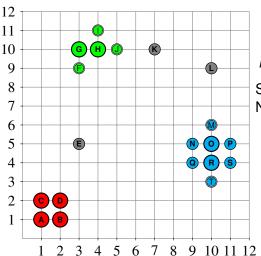
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

### Seed list: NPQS





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

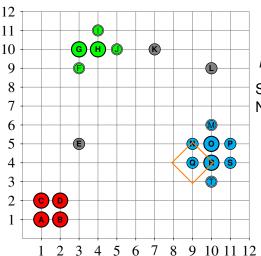
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minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

#### Seed list: NPS



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

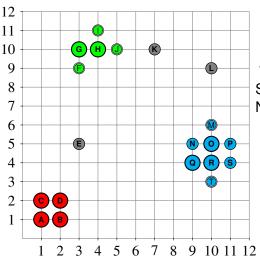
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minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$

#### Seed list: NPS



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

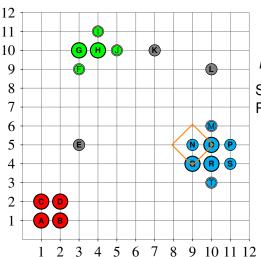
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minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

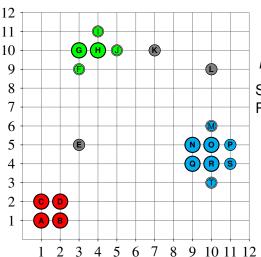
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

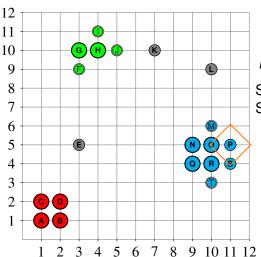
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

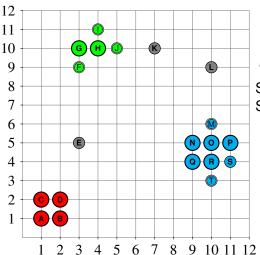
 $\varepsilon = 1.1$ minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$  minPts= 3

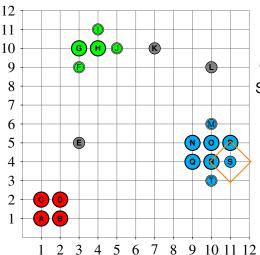
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$  minPts= 3

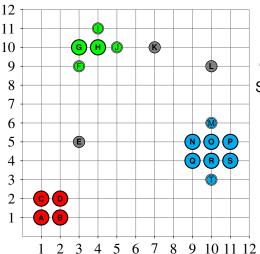
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

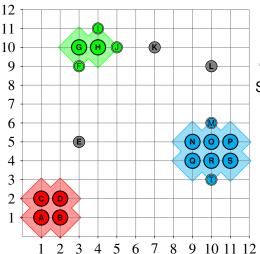
minPts=

minPts= 4  $\varepsilon = 2.1$ minPts= 4

 $\begin{array}{l} \text{minPts} = \ 4 \\ \varepsilon = 4.1 \\ \text{minPts} = \ 5 \end{array}$ 

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 3$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1$ .

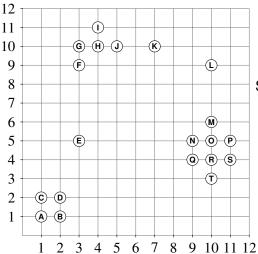
minPts= 4

minPts=

 $\varepsilon = 2.1$ minPts=  $\epsilon$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1$ .

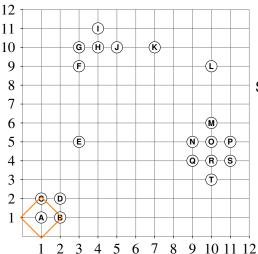
minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$  minPts= 3

E - 1

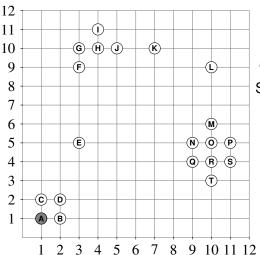
minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

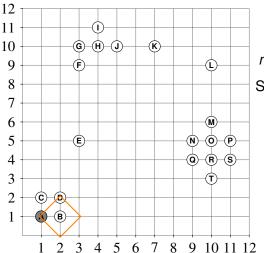
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

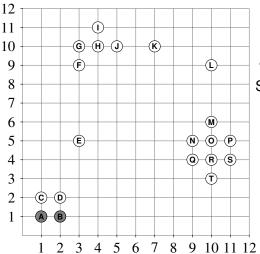
minPts= 3

minPts= 4

 $\varepsilon = 2.1$  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ 

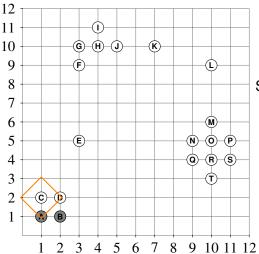
minPts= 2  $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

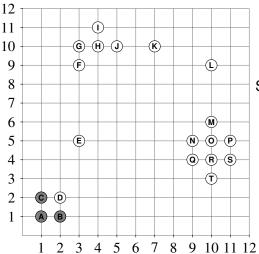
minPts= 4

minPts=

 $\varepsilon = 2.1$ minPts=  $\epsilon$  $\varepsilon = 4.1$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \end{array}$ 

minPts= 3

 $\varepsilon = 1$ 

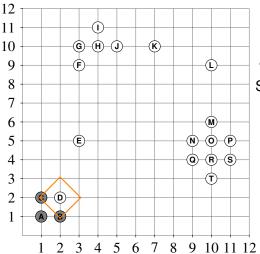
minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1$ 

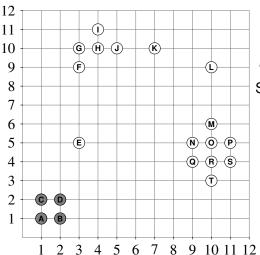
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 $\varepsilon = 2.1$ minPts=  $\epsilon$ 

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ 

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

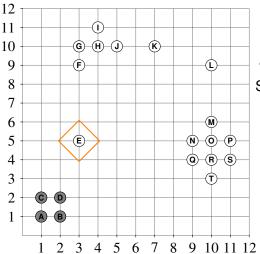
minPts= 3

minPts= 4

 $\varepsilon = 2.1$  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

F - 1

minPts= 4

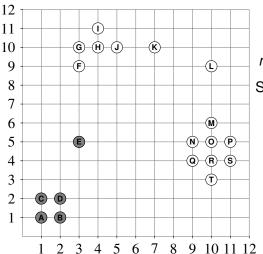
minPts=

 $\varepsilon = 2.1$ minPts=

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ 

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

F - 1

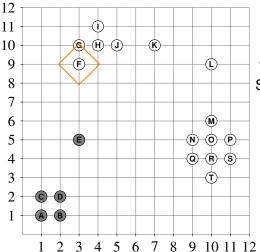
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts=  $\epsilon$   $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

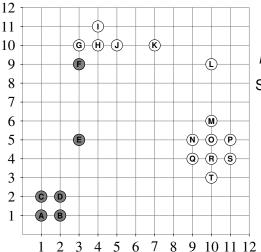
minPts=

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

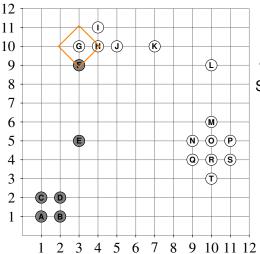
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts=  $\varepsilon$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1$ .

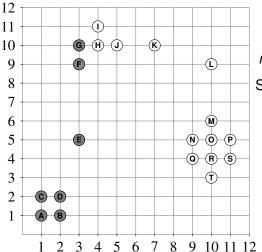
minPts= 4

 $\varepsilon = 2.1$ minPts=

minPts = 4  $\varepsilon = 4.1$ minPts = 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

F - 1

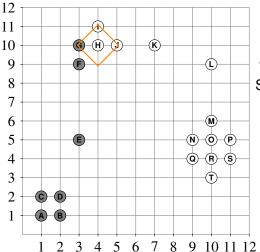
minPts= 4

 $\varepsilon = 2.1$ 

 $\begin{array}{c} \varepsilon = 2.1 \\ \text{minPts} = 4.1 \\ \varepsilon = 4.1 \end{array}$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3

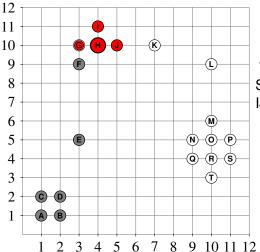
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4

Seed list:

IJ



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

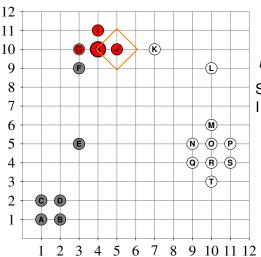
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

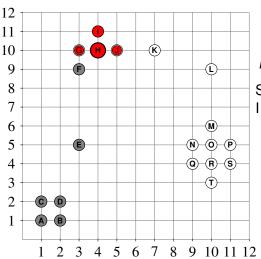
minPts=

 $\varepsilon = 2.1$ minPts=

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1$ 

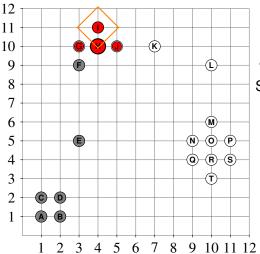
minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1$ .

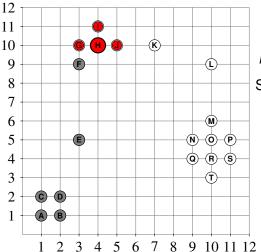
minPts= 4

 $\varepsilon = 2.1$  minPts=

minPts = 4  $\varepsilon = 4.1$ minPts = 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1$ .

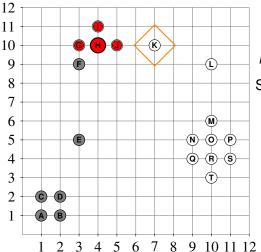
minPts= 4

 $\varepsilon = 2.1$ minPts=

minPts = 4  $\varepsilon = 4.1$ minPts = 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

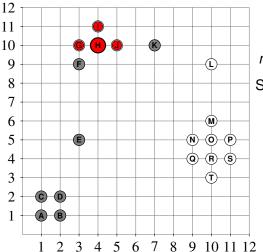
minPts=

 $\varepsilon = 2.1$  minPts=

minPts = 4  $\varepsilon = 4.1$ minPts = 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

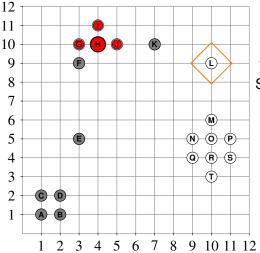
 $\varepsilon = 1.1$ minPts= 4

minPts=

 $\varepsilon = 2.1$ minPts=  $\epsilon$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1$ 

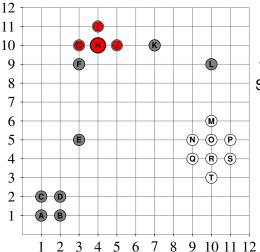
minPts= 4

 $\varepsilon = 2.1$ minPts=

minPts = 4  $\varepsilon = 4.1$ minPts = 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \end{array}$ 

minPts= 3

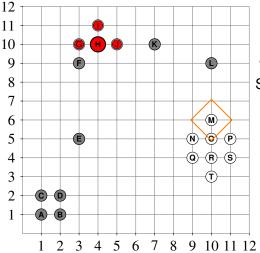
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts=  $\varepsilon$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1$ .

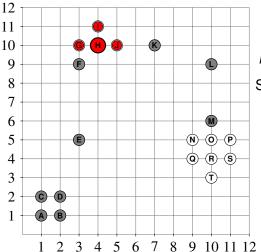
minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

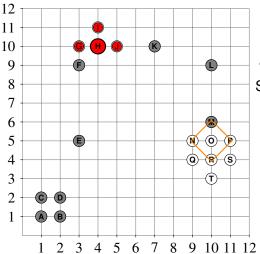
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

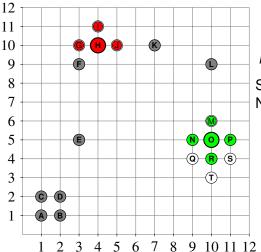
 $\varepsilon = 2.1$ 

minPts=

 $\varepsilon = 4.1$ minPts= 5

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$

### Seed list: NPR



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1$ 

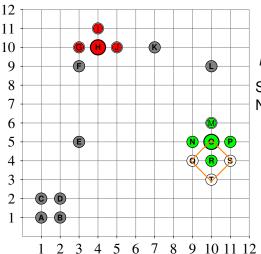
minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts= 5  $\varepsilon$  = 4.1
minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1$ .

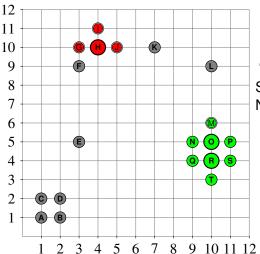
minPts= 4

 $\varepsilon = 2.1$ minPts=

minPts= 4  $\varepsilon = 4.1$ minPts= 5

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$

### Seed list: NPQST





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

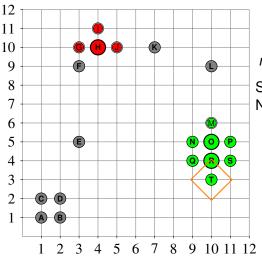
 $\varepsilon = 1$ .

minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$

### Seed list: NPQS





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts=

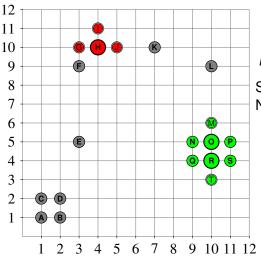
minPts= 4

 $\varepsilon = 2.1$ 

minPts=  $\epsilon$   $\epsilon = 4.1$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4

Seed list: NPQS



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

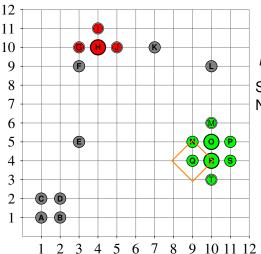
 $\varepsilon = 1$ .

minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$

Seed list: NPS



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

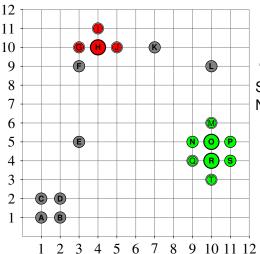
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$

Seed list: **NPS** 



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

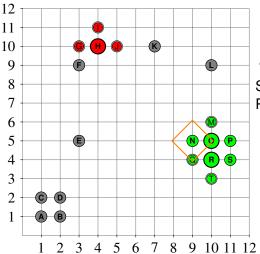
 $\varepsilon = 1$ 

minPts= 4

 $\varepsilon = 2.1$  minPts=

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$





#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

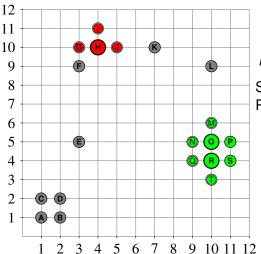
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$





#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

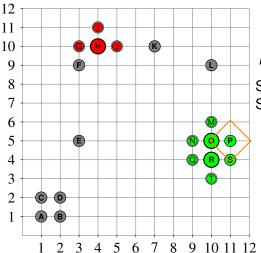
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

$$minPts = 4$$





#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

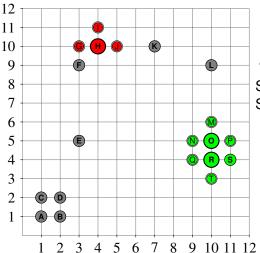
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4

Seed list:

S



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

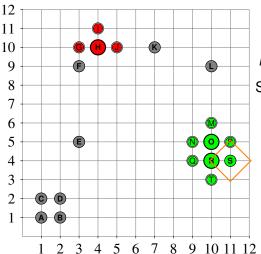
 $\varepsilon = 1$ .

minPts= 4

 $\varepsilon = 2.1$ minPts=  $\epsilon$  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1 minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

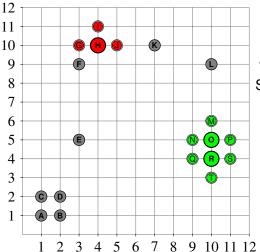
minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1$ 

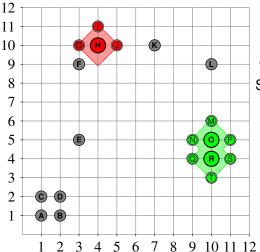
minPts= 4

 $\varepsilon = 2.1$ 

minPts=  $\epsilon$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 1.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7- $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

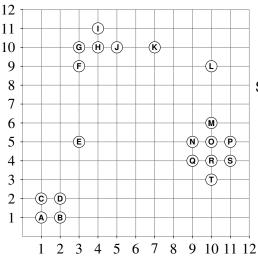
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

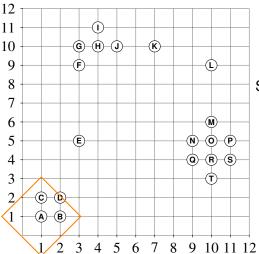
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

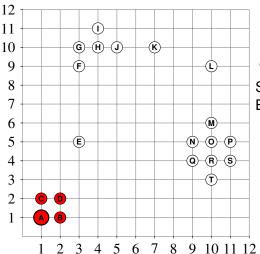
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

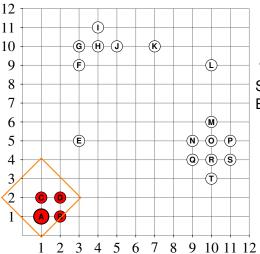
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3 minPts= 4

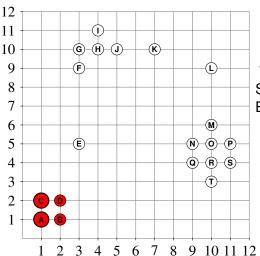
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

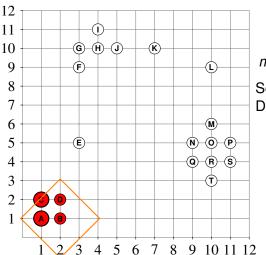
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

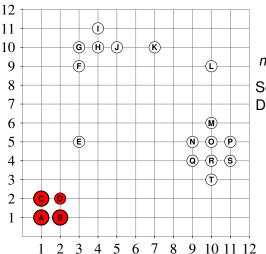
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

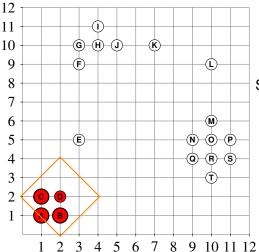
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

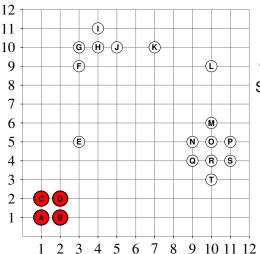
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

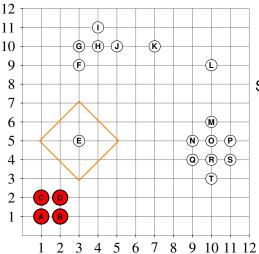
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

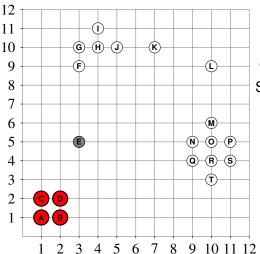
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

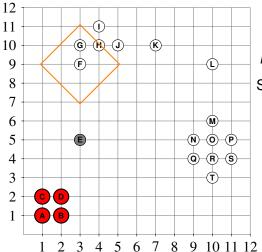
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7- $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

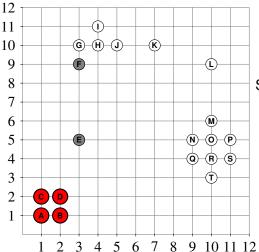
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

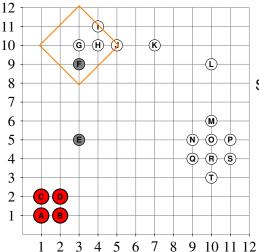
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

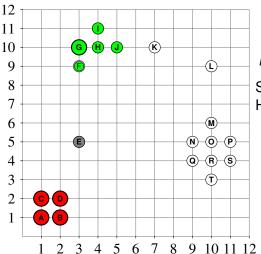
 $\varepsilon = 2.1$ 

minPts= 4

 $\begin{array}{c} \varepsilon = 4.1 \\ \text{minPts} = 5 \end{array}$ 

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4

Seed list: HIJ





#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

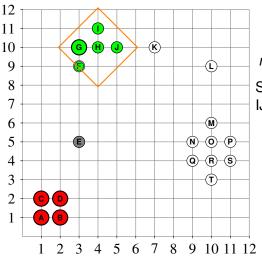
 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4

Seed list:

IJ



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

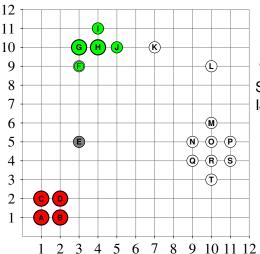
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3  $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

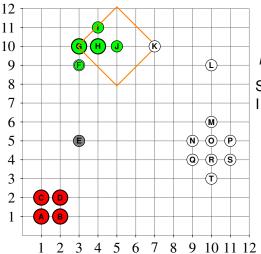
 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list:

I



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

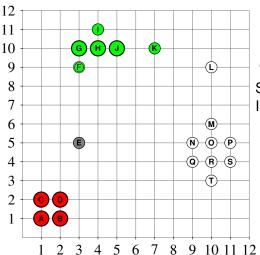
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4

Seed list:

ΙK



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

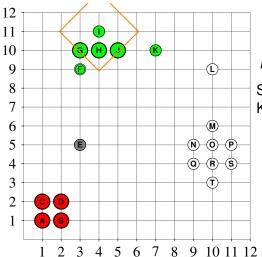
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$







#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

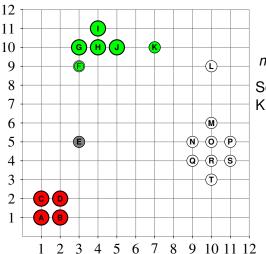
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

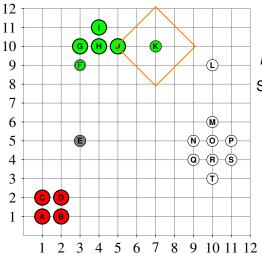
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

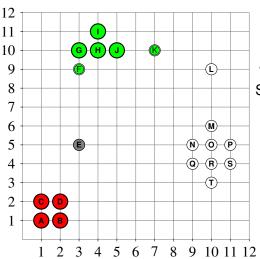
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

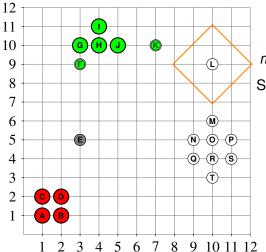
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

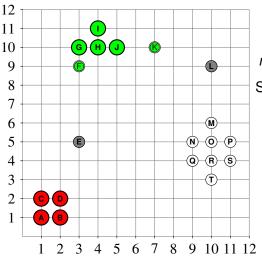
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

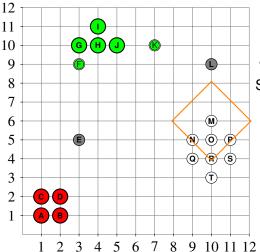
 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

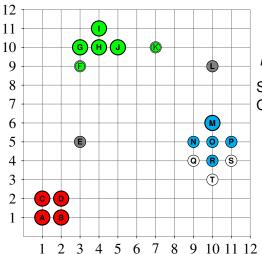
minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: ONPR



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$  minPts= 3

 $\varepsilon = 1.1$ minPts= 4

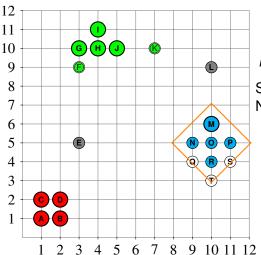
 $\varepsilon = 2.1$ 

minPts= 4

 $\begin{array}{c} \varepsilon = 4.1 \\ \text{minPts} = 5 \end{array}$ 

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4

Seed list: NPR





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3  $\varepsilon = 1.1$ minPts= 4

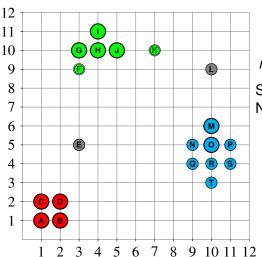
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: NPRQST



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

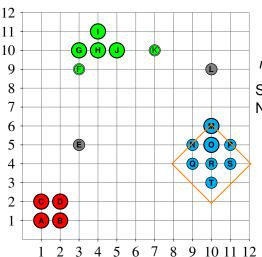
minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: **NPQST**



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3  $\varepsilon$  = 1.1

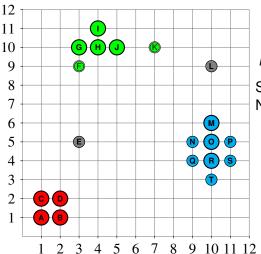
minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: NPQST





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

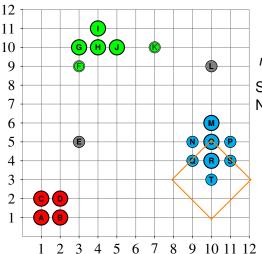
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: NPQS





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3  $\varepsilon = 1.1$ 

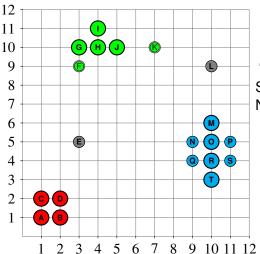
minPts= 4  $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$  minPts= 5

 $\begin{array}{c} \varepsilon = 4.1 \\ \text{minPts} = 4 \end{array}$ 

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: NPQS



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3  $\varepsilon = 1.1$ 

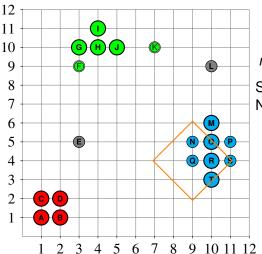
minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

Seed list: NPS



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

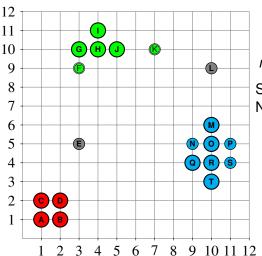
 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$

### Seed list: NPS





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

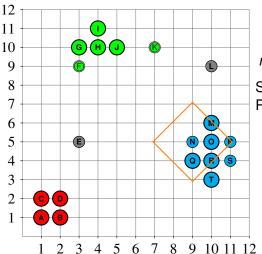
 $\varepsilon = 2.1$ minPts= 4

minPts=  $\epsilon$ 

minPts= 5  $\varepsilon$  = 4.1

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\varepsilon = 1.1$ minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

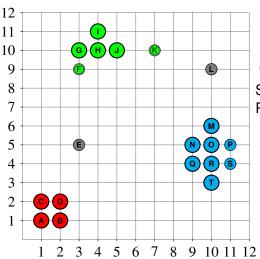
minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4

minPts=  $\epsilon$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$  minPts= 3

 $\varepsilon = 1.1$ minPts= 4

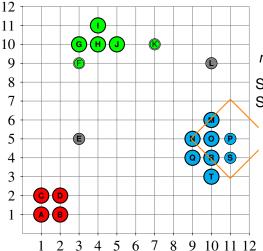
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4

Seed list:

S



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

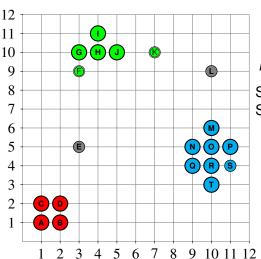
minPts= 4  $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

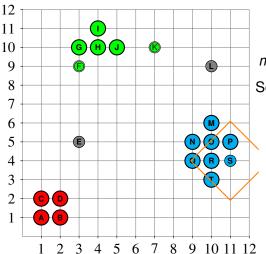
minPts= 4

minPts=  $\epsilon$ 

minPts= 5  $\varepsilon$  = 4.1

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### **Data Mining** Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

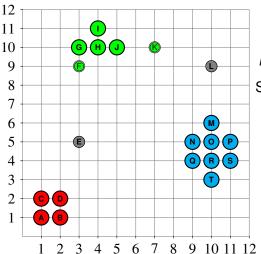
minPts= 4  $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

$$minPts = 4$$





Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ minPts= 3

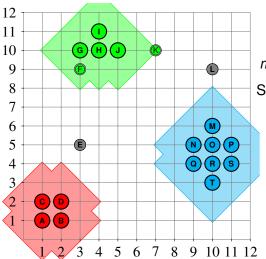
minPts= 3  $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4  $\varepsilon = 4.1$ 

minPts = 5  $\varepsilon = 4.1$ minPts = 4

Aufgabe 7-2



$$\varepsilon = 2.1$$

minPts = 4



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7- $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

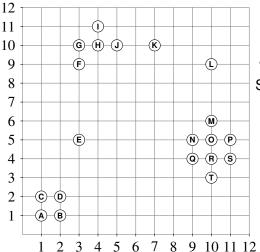
minPts= 5

- - 4

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

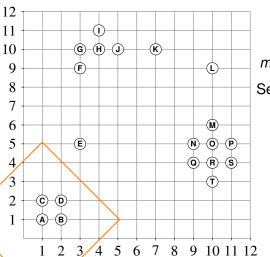
minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-  $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4

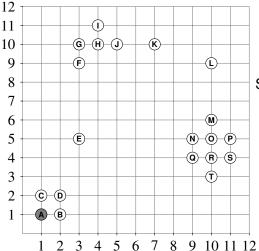
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4

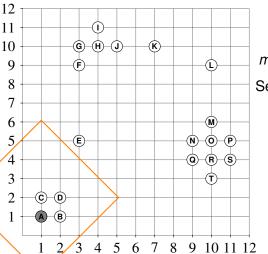
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

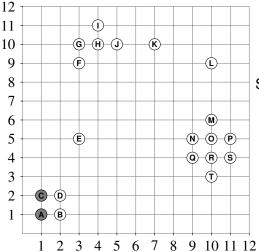
minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-  $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

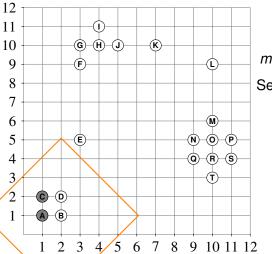
minPts= 5

minPts=

 $\varepsilon = 4.1$ minPts= 4

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Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

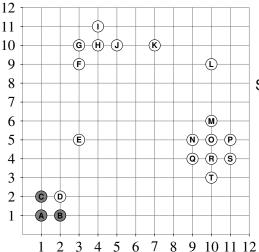
minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$  minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ 

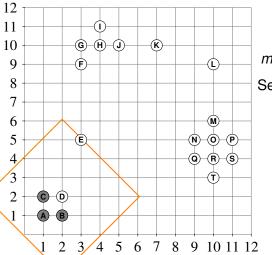
minPts= 5

minPts=

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

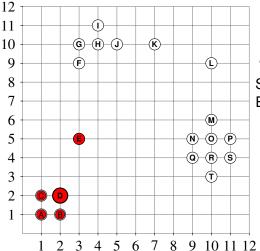
minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$







#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-  $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

 $\varepsilon = 2.1$ minPts= 4

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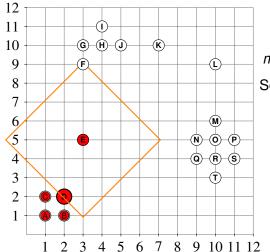
 $\varepsilon = 4.1$ minPts= 5

minPts=

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

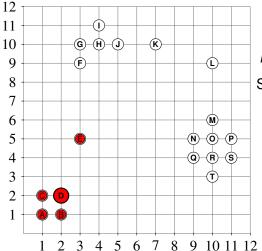
minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:



**Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

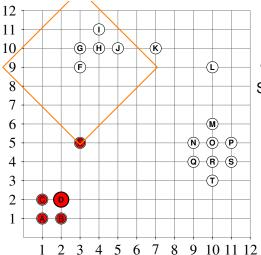
 $\varepsilon = 2.1$ 

minPts= 4

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4



$$\varepsilon = 4.1$$

$$minPts = 5$$





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 2.1$ 

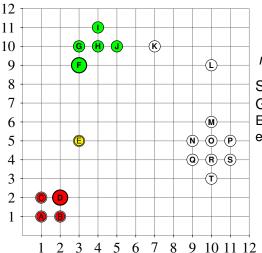
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: **GHIJ**

E nicht eindeutig!



Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ 

 $\varepsilon = 2.1$ 

minPts=

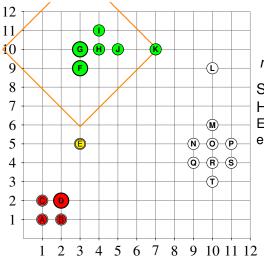
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list: HIJ

HIJ E nicht eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 2.1$ 

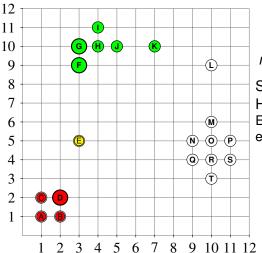
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: HIJK

E nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts=

 $\varepsilon = 2.1$ 

minPts=

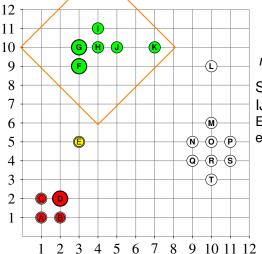
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

### IJK E nicht

eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts=

 $\varepsilon = 2.1$ 

minPts=

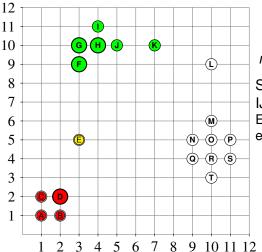
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:

IJK E nicht eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 2.1$ 

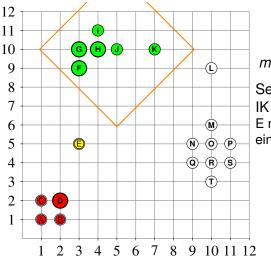
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:

E nicht

eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 2.1$ 

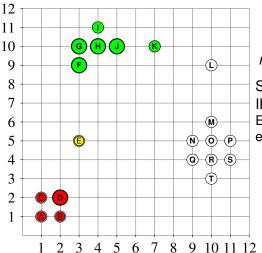
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:

ΙK

E nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$  minPts= 3

 $\varepsilon = 1.1$ 

minPts=

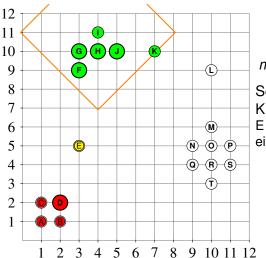
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:

Seed list

E nicht eindeut

eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

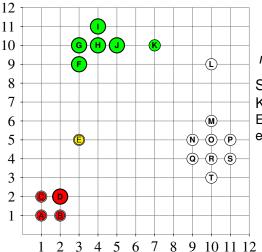
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

K E nicht

eindeutig!



#### **Data Mining** Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

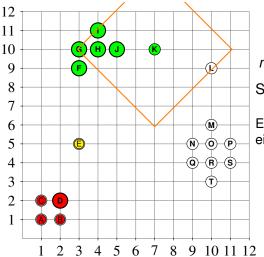
minPts= 3

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

E nicht eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

 $\varepsilon = 2.1$ 

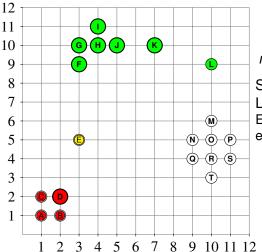
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

E nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7- $\varepsilon = 1.1$ 

minPts= 2

minPts= 3

minPts=

 $\varepsilon = 2.1$ 

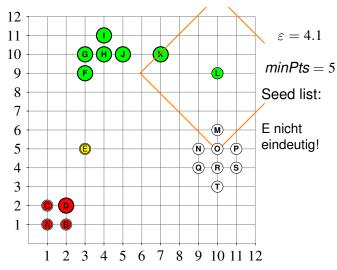
minPts=

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

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#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

minPts= 3

 $\varepsilon = 1.1$ minPts=

 $\varepsilon = 2.1$ 

minPts=

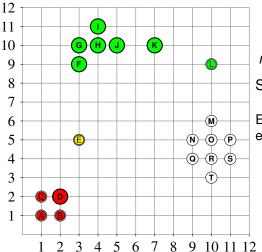
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

E nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ 

 $\varepsilon = 2.1$ 

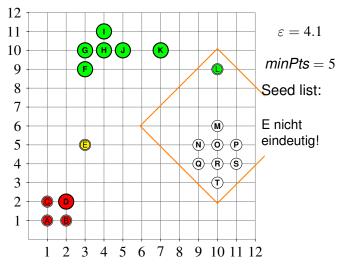
minPts=

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \\ \text{minPts} = 3 \end{array}$ 

 $\begin{array}{c} \varepsilon = 1.1 \\ \text{minPts} = 4 \end{array}$ 

 $\varepsilon = 2.1$ 

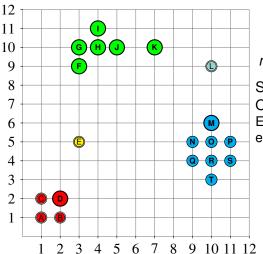
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

ε = 4.1 minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: ONPRQST E und L nicht eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

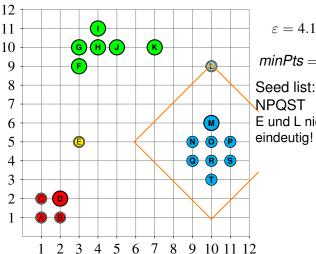
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

# **NPQST** E und L nicht





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \\ \text{minPts} = 3 \end{array}$ 

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

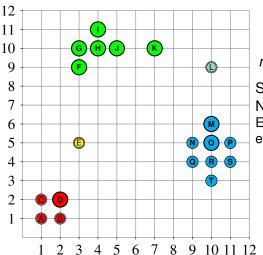
minPts=  $\epsilon$ 

minPts= 5

 $\varepsilon = 4.1$ 

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: NPQST E und L nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$  minPts= 3

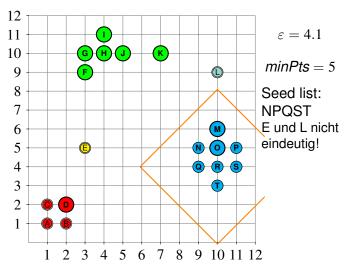
minPts=

 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \\ \text{minPts} = 3 \\ \varepsilon = 1.1 \end{array}$ 

minPts=  $\varepsilon = 2.1$ 

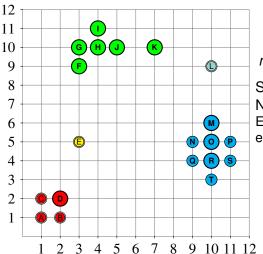
minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: NPQST E und L nicht eindeutig!



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

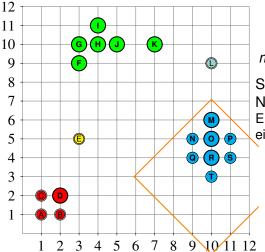
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: **NPQS**

E und L nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ minPts= 3

minPts = 3  $\varepsilon = 1.1$ minPts = 4

 $\varepsilon = 2.1$ minPts=

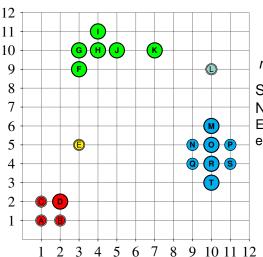
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list: NPQS

E und L nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \end{array}$ 

minPts= 3 $\varepsilon = 1.1$ 

minPts=

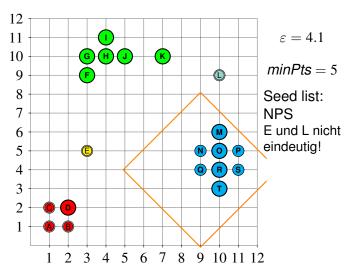
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4





#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2 minPts= 3

 $\varepsilon = 2.1$ 

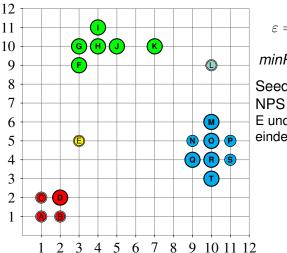
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

# Seed list:

E und L nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7-1  $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

 $\varepsilon = 2.1$ 

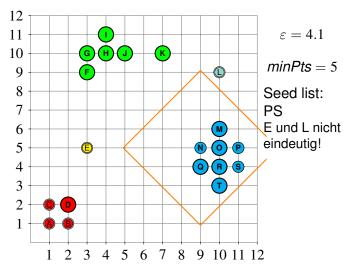
minPts=

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

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#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2  $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

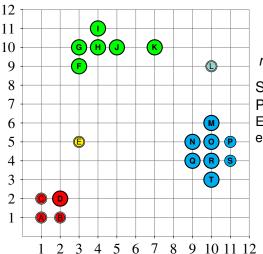
minPts=  $\epsilon$ 

minPts= 5

 $\varepsilon = 4.1$ 

ε = 4.1 minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

# PS

E und L nicht eindeutig!



#### Data Mining Tutorial

Aufgabe 7-1

Aulgabe 7- $\varepsilon = 1.1$ 

minPts = 2  $\varepsilon = 1.1$ 

minPts= 3

minPts=

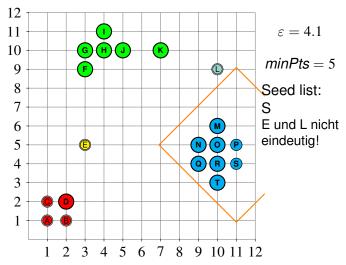
 $\varepsilon = 2.1$ 

minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \\ \text{minPts} = 3 \end{array}$ 

minPts=

 $\varepsilon = 2.1$ minPts=

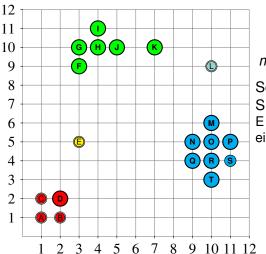
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

ε = 4.1 minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

Seed list:

Seed list

E und L nicht eindeutia!





#### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = \ 2 \\ \varepsilon = 1.1 \end{array}$ 

minPts= 3 $\varepsilon = 1.1$ 

minPts=

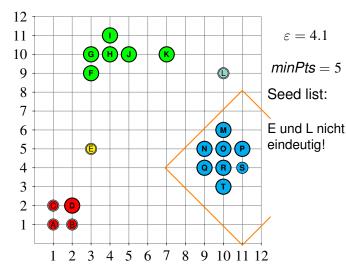
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4





#### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\varepsilon = 1.1$ minPts= 2  $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$  minPts= 4

 $\varepsilon = 2.1$ 

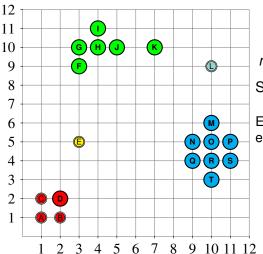
 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 5$$

### Seed list:

E und L nicht eindeutig!



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\varepsilon = 1.1$ minPts = 3  $\varepsilon = 1.1$ 

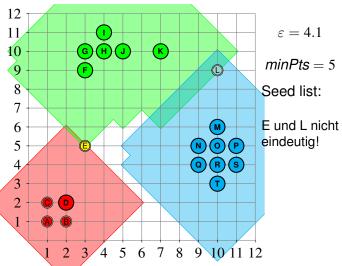
minPts=  $\varepsilon = 2.1$ 

minPts=

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ 

minPts= 4





#### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$  minPts= 3

 $\varepsilon = 1.1$ minPts= 4

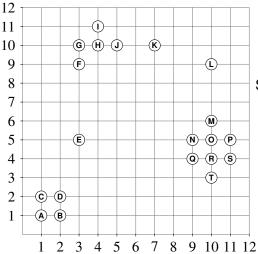
 $\varepsilon = 2.1$ 

minPts=

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

Seeds:



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4  $\varepsilon = 2.1$ 

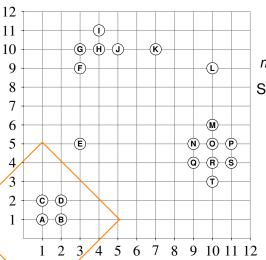
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

Seeds:



#### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

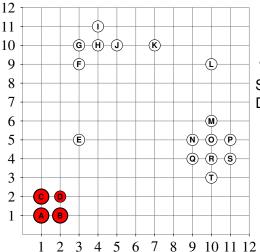
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

D



### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2

 $\varepsilon = 1.1$ minPts= 3

minPts= 4

 $\varepsilon = 2.1$ 

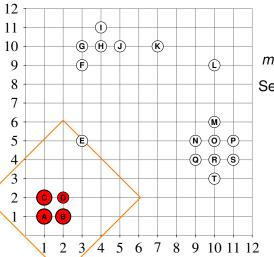
minPts= 4

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

Seeds:



### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

minPts= 4

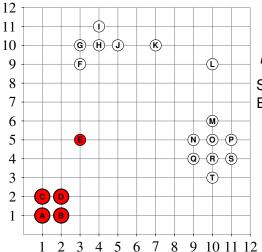
 $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

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### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon = 1.1$ 

minPts= 3

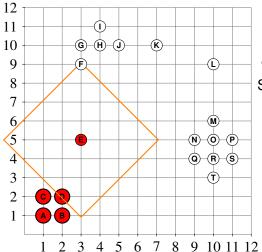
minPts= 4  $\varepsilon = 2.1$ 

 $\varepsilon = 4.1$ 

minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

Seeds:



### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7- $\varepsilon = 1.1$ 

minPts= 2  $\varepsilon$  = 1.1

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ 

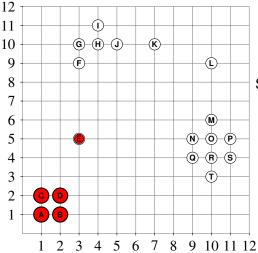
minPts=

 $\varepsilon = 4.1$ minPts= 5

minPts= :  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

Seeds:



### **Data Mining Tutorial**

Aufgabe 7-1

 $\varepsilon = 1.1$ 

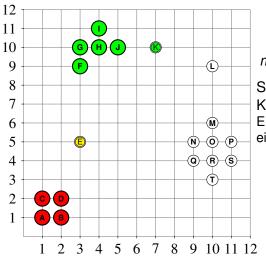
minPts= 2  $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 4.1$ 

minPts= 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

K E nicht



### Data Mining Tutorial

Aufgabe 7-1

 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ 

minPts= 3  $\varepsilon = 1.1$ 

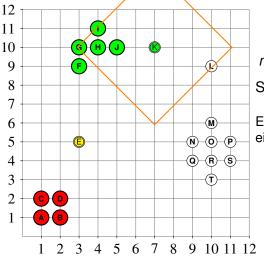
 $\varepsilon = 2.1$ 

minPts=

 $\begin{array}{c} \varepsilon = 4.1 \\ \text{minPts} = 5 \end{array}$ 

 $\begin{array}{c} \varepsilon = 4.1 \\ \text{minPts} = 4 \end{array}$ 

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

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### **Data Mining Tutorial**

Aufgabe 7-1

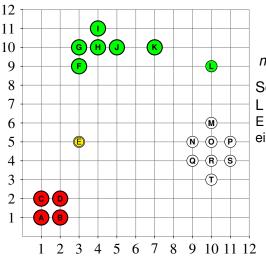
 $\varepsilon = 1.1$ minPts= 2

 $\varepsilon = 1.1$ minPts= 3

 $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

E nicht

eindeutig!



### Data Mining Tutorial

Aufgabe 7-1

Autgabe 7-1  $\varepsilon = 1.1$ 

 $\begin{array}{l} \text{minPts} = \ 2 \\ \varepsilon = 1.1 \end{array}$ 

minPts= 3

minPts=  $\varepsilon = 2.1$ 

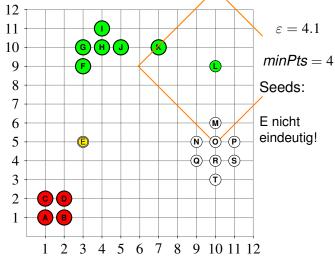
 $\varepsilon = 2$ . minPts=

 $\varepsilon = 4.1$ minPts= 5

minPts= :  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2





### Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$   $\min_{\text{minPts}= 2}$ 

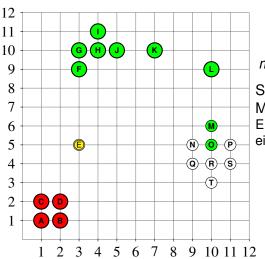
 $\varepsilon = 1.1$   $\min \text{Pts} = 3$   $\varepsilon = 1.1$  $\min \text{Pts} = 4$ 

 $\varepsilon = 2.1$ minPts=  $\epsilon$ 

 $\varepsilon = 4.1$  minPts= 5

 $\varepsilon = 4.1$  minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

# Seeds:

MO E nicht eindeutig!



### Data Mining Tutorial

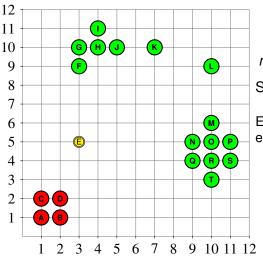
Aufgabe 7-1  $\varepsilon = 1.1$  minPts= 2

 $\begin{array}{l} \text{minPts} = 2 \\ \varepsilon = 1.1 \\ \text{minPts} = 3 \\ \varepsilon = 1.1 \\ \text{minPts} = 4 \end{array}$ 

 $\varepsilon = 2.1$  minPts=  $\varepsilon$ 

 $\varepsilon = 4.1$ minPts= 5  $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2



$$\varepsilon = 4.1$$

$$minPts = 4$$

### Seeds:

E nicht eindeutig!



Data Mining Tutorial

Aufgabe 7-1  $\varepsilon = 1.1$ 

 $\varepsilon = 1.1$ minPts= 2  $\varepsilon = 1.1$ minPte= 3

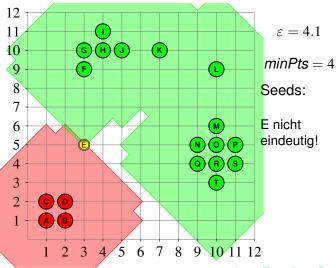
 $\begin{array}{l} \text{minPts} = \ 3 \\ \varepsilon = 1.1 \\ \text{minPts} = \ 4 \end{array}$ 

 $\varepsilon = 2.1$ minPts=  $\varepsilon$ 

minPts = 5  $\varepsilon = 4.1$ 

minPts= 4

Aufgabe 7-2





Data Mining Tutorial

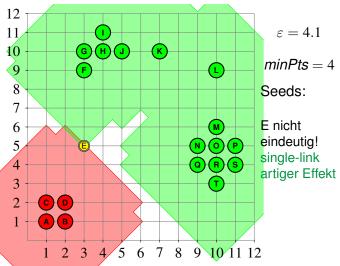
Aufgabe 7-1  $\varepsilon = 1.1$  minPts = 2

 $\varepsilon = 1.1$ minPts= 3  $\varepsilon = 1.1$ minPts= 4

 $\varepsilon = 2.1$ minPts= 4  $\varepsilon = 4.1$ minPts= 5

 $\varepsilon = 4.1$ minPts= 4

Aufgabe 7-2





# DBSCAN - Eigenschaften

### Data Mining Tutorial

# Aufgabe 7-1 $\varepsilon = 1.1$ minPts= 2 $\varepsilon = 1.1$ minPts= 3 $\varepsilon = 1.1$ minPts= 4 $\varepsilon = 2.1$ minPts= 4 $\varepsilon = 4.1$ minPts= 5 $\varepsilon = 4.1$

minPts= 4
Aufgabe 7-2

### Diskutieren Sie folgende Fragen / Aussagen zu DBSCAN:

- ▶ Bei *minPts* = 2, was passiert mit Randpunkten?
- Das Ergebnis von DBSCAN ist determiniert auf Kernund Noise-Punkten, aber nicht Randpunkten!
- ► Ein Cluster in DBSCAN kann weniger als *minPts* Punkte enthalten
- ► Hat der Datensatz *n* Objekte, so stellt DBSCAN stets genau *n* Nachbarschaftsanfragen.
- Auf gleichverteilten Daten wird DBSCAN in der Regel fast alles in einen Cluster clustern, oder alles als Noise klassifizieren.
  - *k*-means hingegen wird in der Regel die Daten in *k* etwa gleich große Partitionen aufteilen.