Lecture title

Subject
Week

Me

melbournebioinformatics.org.au

Lecture title

1. Contents slide starts with a single #
2. Example algorithms

Normal slides start with a double

- content goes here

Columns

left col

right col

Overprint

Clipped images

Code blocks

```
put anything in the
class name and you
get grey
```

- it should match the text
  indent

```
1  add .numberLines for
2  numbered lines
```

```
1  work out bash/python
```

Alert blocks

Alerted block

- alerted content

- use the three colons to break out of the alertblock

We also have unstyled H3 blocks

- this matches the layout of alert blocks
- but has no colour

You need to use latex code to style the headers

- use the contrast sparingly for highlights

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2. Example algorithms

Example algorithms

K-means (D, k, ε)

1 $t = 0$
2 Randomly initialize k centroids: $\mu_1^t, \mu_2^t, ..., \mu_k^t \in \mathbb{R}^d$
3 **repeat**
4      $t \leftarrow t + 1$
5      $C_j \leftarrow \varnothing$ for all $j = 1, ..., k$
      // Cluster assignment step
6   **foreach** $x_j \in D$ **do**
7          $j^* \leftarrow \arg\min_i \left\{ \left\| x_j - \mu_i^t \right\|^2 \right\}$ // Assign x_j
          to closest centroid
8          $C_{j^*} \leftarrow C_{j^*} \cup \left\{ x_j \right\}$
      // Centroid update step
9   **foreach** $i = 1$ *to* k **do**
10         $\mu_i^t \leftarrow \frac{1}{|C_i|} \sum_{x_j \in C_i} x_j$
11 **until** $\sum_{i=1}^{k} \left\| \mu_i^t - \mu_i^{t-1} \right\|^2 \leq \varepsilon$

Procedure Dbscan(X, ε, minpts)

1 **foreach** *unvisited point $x \in X$* **do**
2   mark x as visited
3      $N \leftarrow$ GetNeighbours(x, ε)
4   **if** $|N| <$ *minpts* **then**
5   mark x as noise
6   **else**
7          $C \leftarrow \{x\}$
8   **foreach** *point $x' \in N$* **do**
9              $N \leftarrow N \setminus x'$
10   **if** x' *is not visited* **then**
11   mark x' as visited
12                 $N' \leftarrow$ GetNeighbours(x', ε)
13   **if** $|N'| \geq$ *minpts* **then**
14                     $N \leftarrow N \cup N'$
15   **if** x' *is not yet member of any cluster* **then**
16                 $C \leftarrow C \cup \{x'\}$

Non-negativity: $d(a, b) \geq 0$
Identity: $d(a, a) = 0$
Symmetry: $d(a, b) = d(b, a)$
Triangle inequality: $d(a, c) \leq d(a, b) + d(b, c)$