Section 2

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Today

Today

1. Determining the optimal K for clustering

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2. MALLET: LDA for bulk documents

Optimal K

How can we find optimal K?

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- **Naive:**

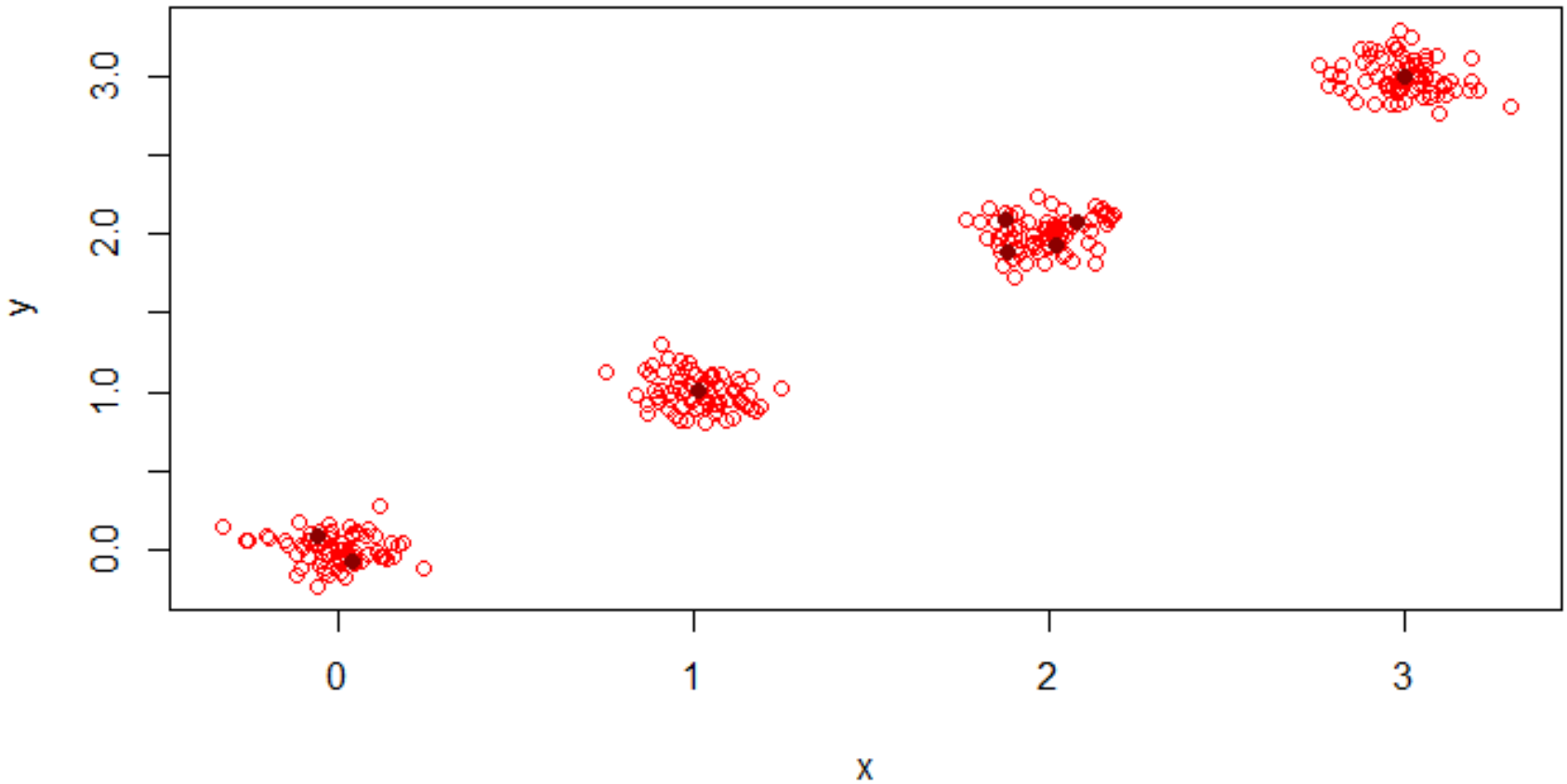
How can we find optimal K?

- **Naive:**Try to minimize within cluster sum of squares

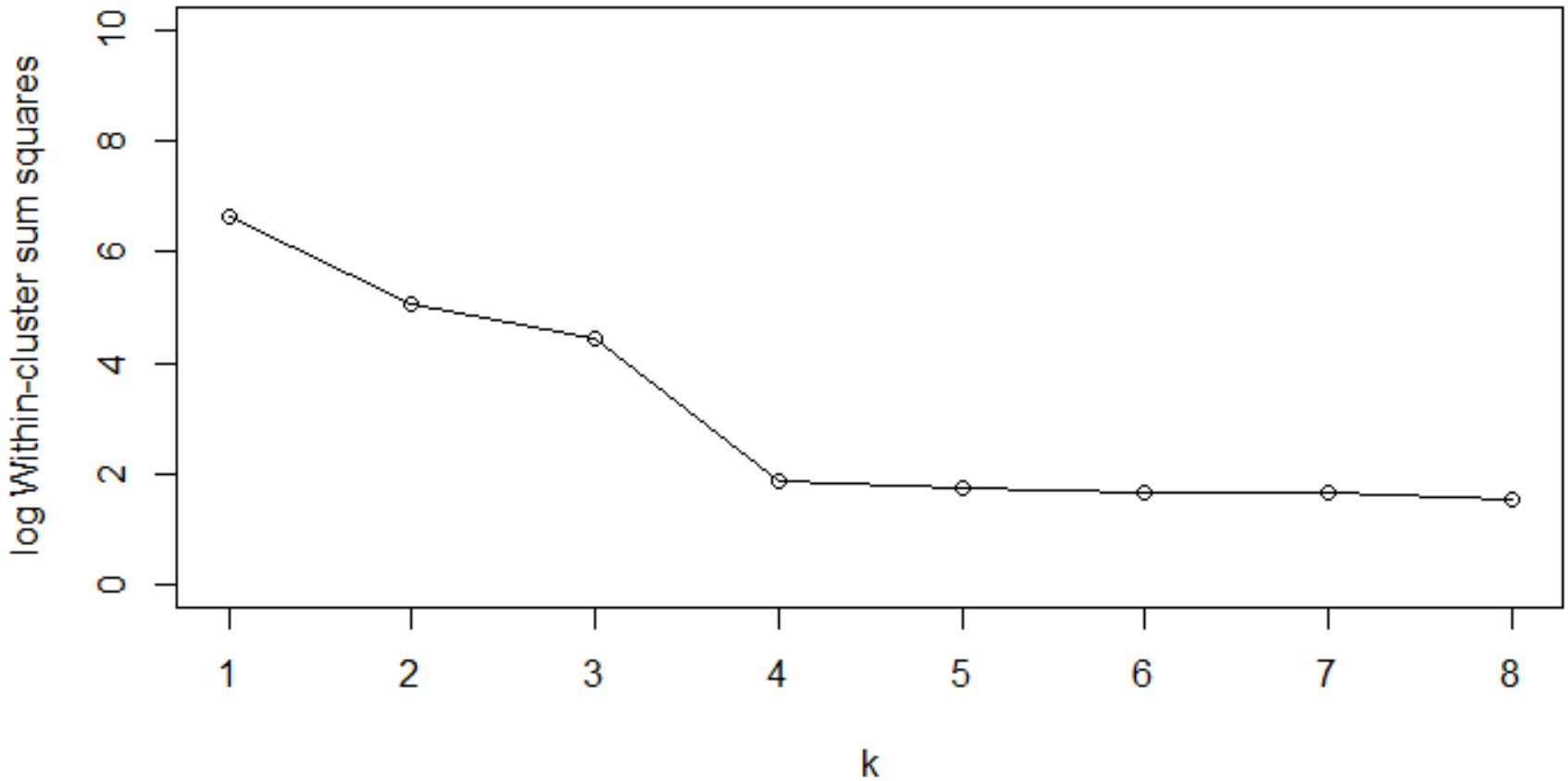
How can we find optimal K?

- **Naive:**Try to minimize within cluster sum of squares
- Doesn't work - trivial solution where each obs has its own cluster

"Eyeballing" Within-SS



"Eyeballing" Within-SS



Cluster Gap Statistic

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- Statistical method to determine optimal k (Tibshirani, Walther, and Hastie 2001)

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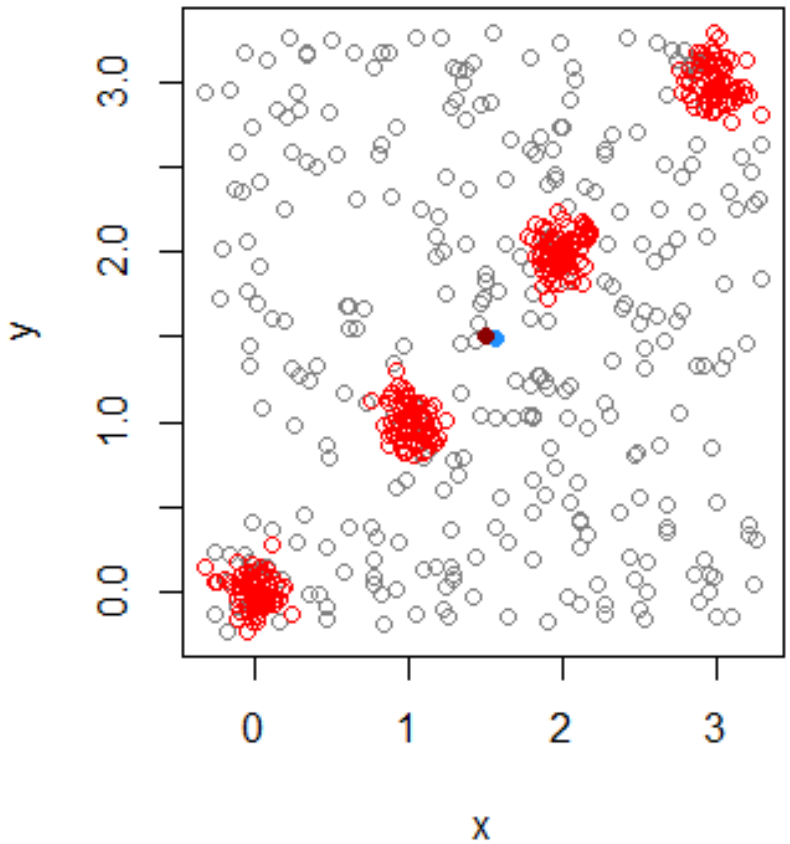
- Intuition: How much does adding an unnecessary cluster reduce within-ss?

Cluster Gap Statistic

- Statistical method to determine optimal k (Tibshirani, Walther, and Hastie 2001)
- Intuition: How much does adding an unnecessary cluster reduce within-ss?
- Compare reduction in log(within-ss) by adding an additional cluster to random data vs reduction in your data

Intuition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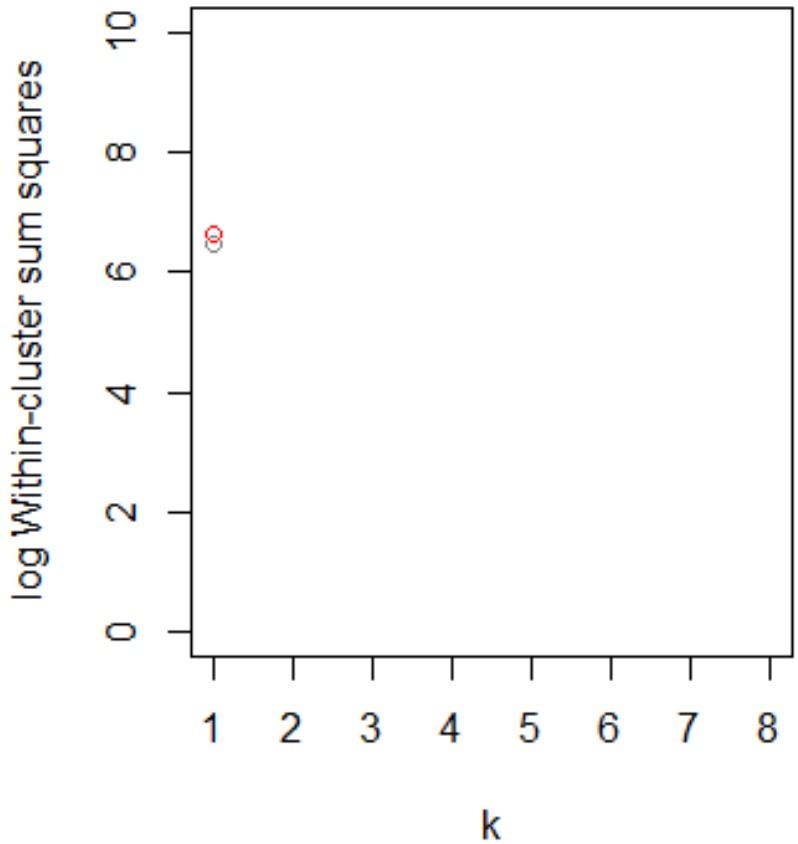
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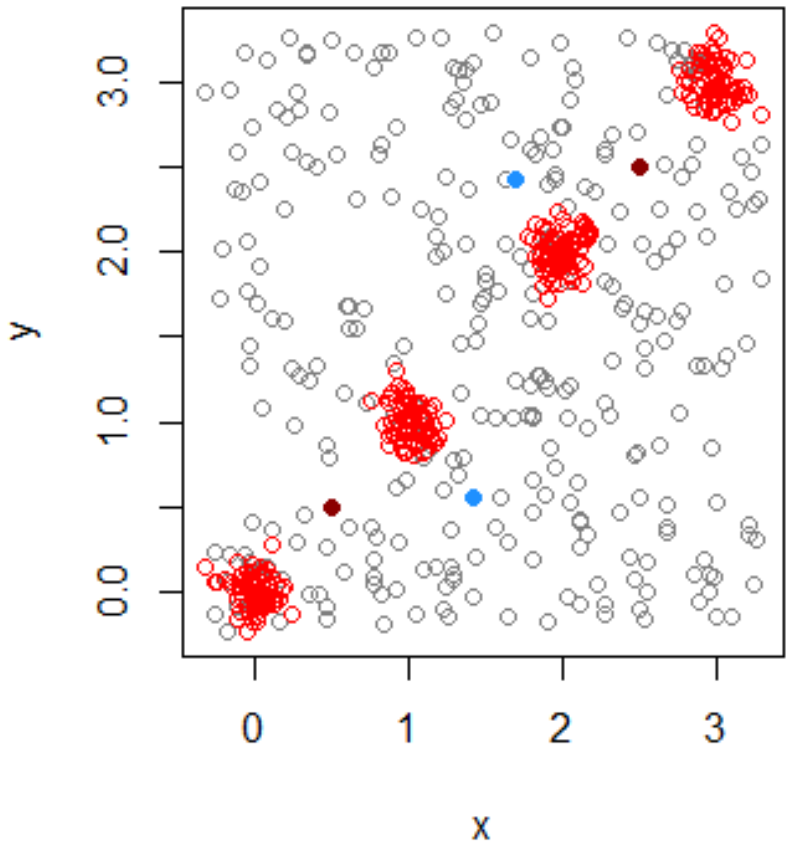
Intuition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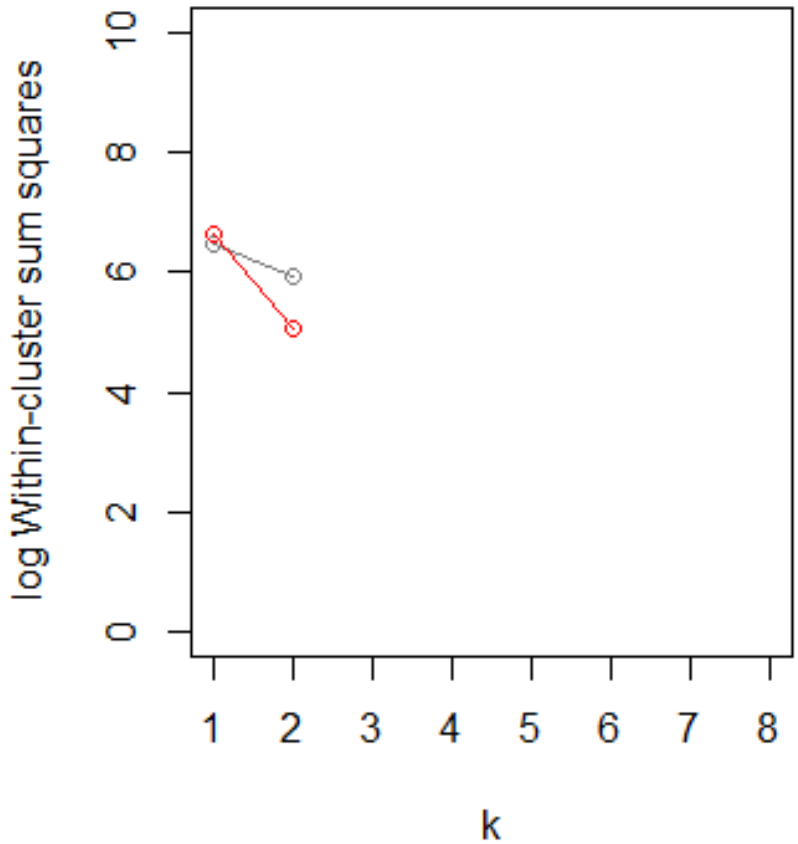
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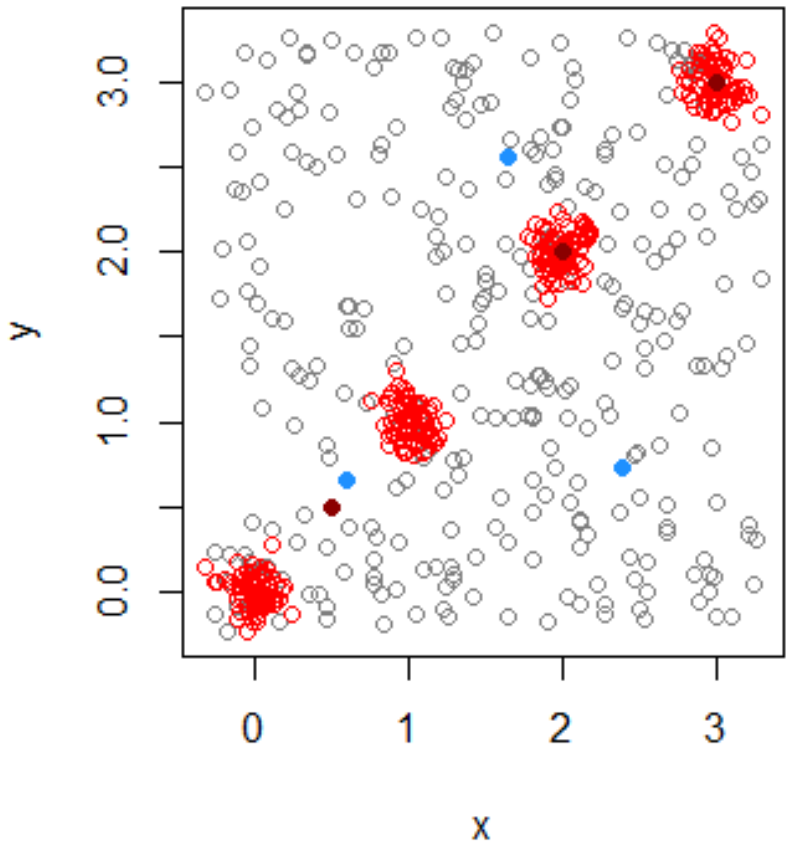
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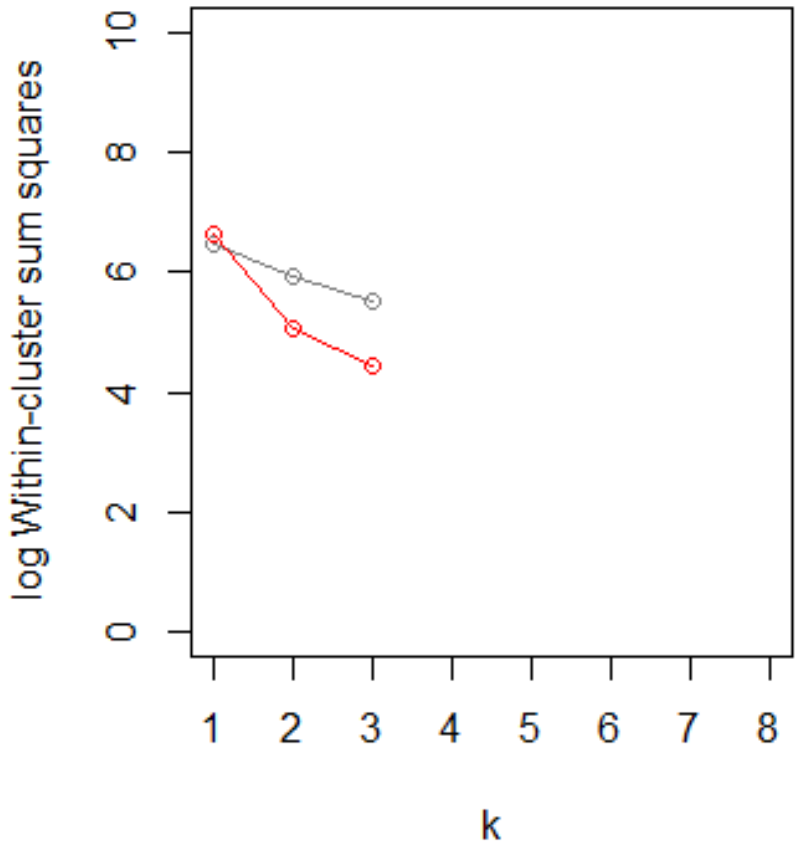
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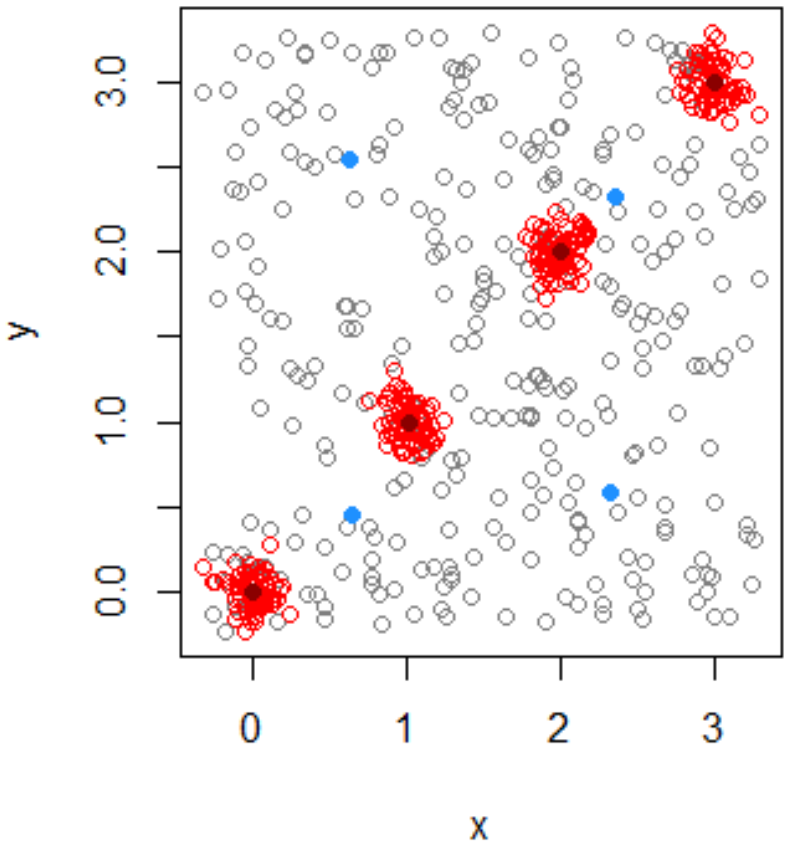
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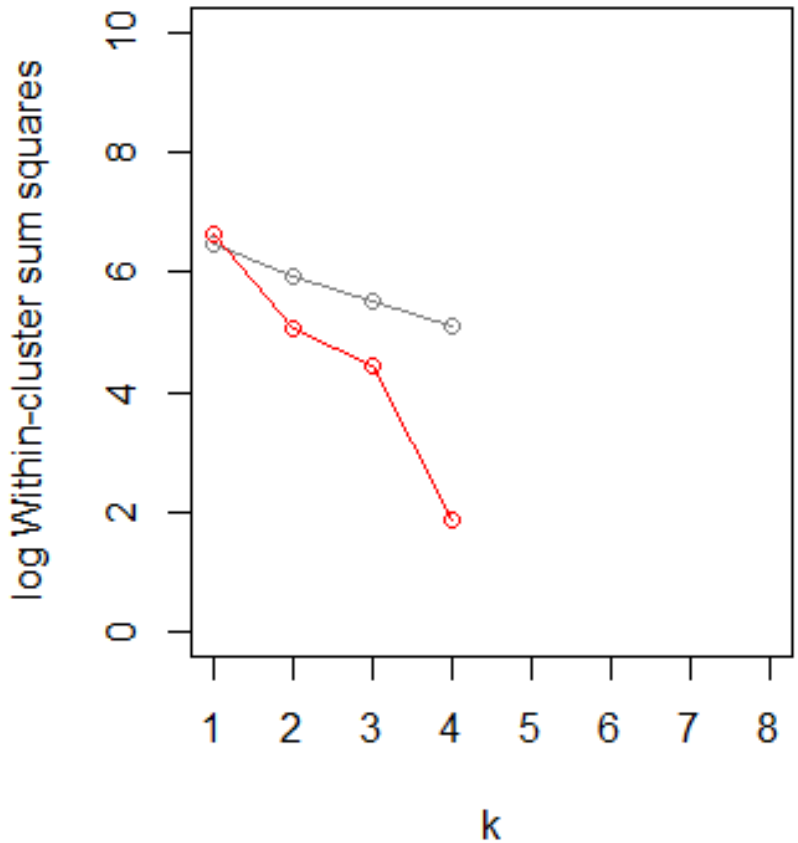
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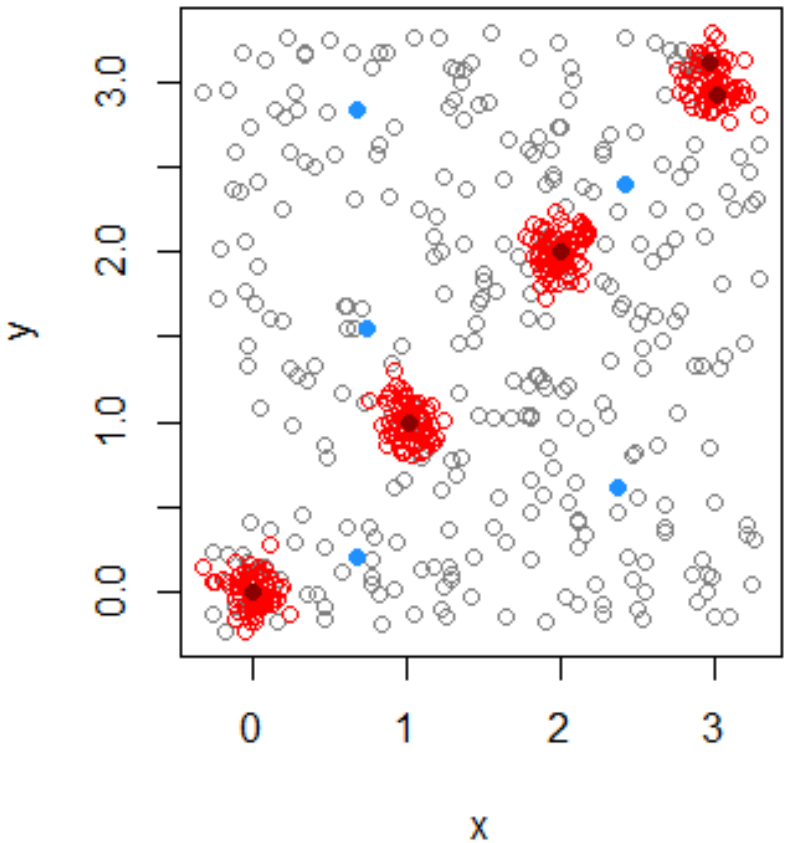
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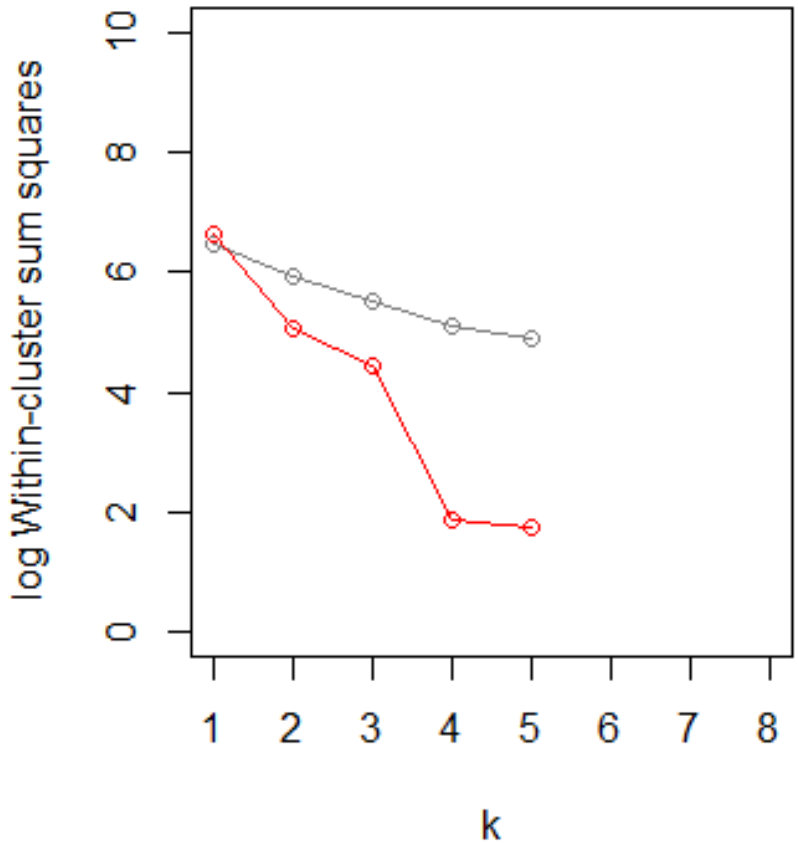
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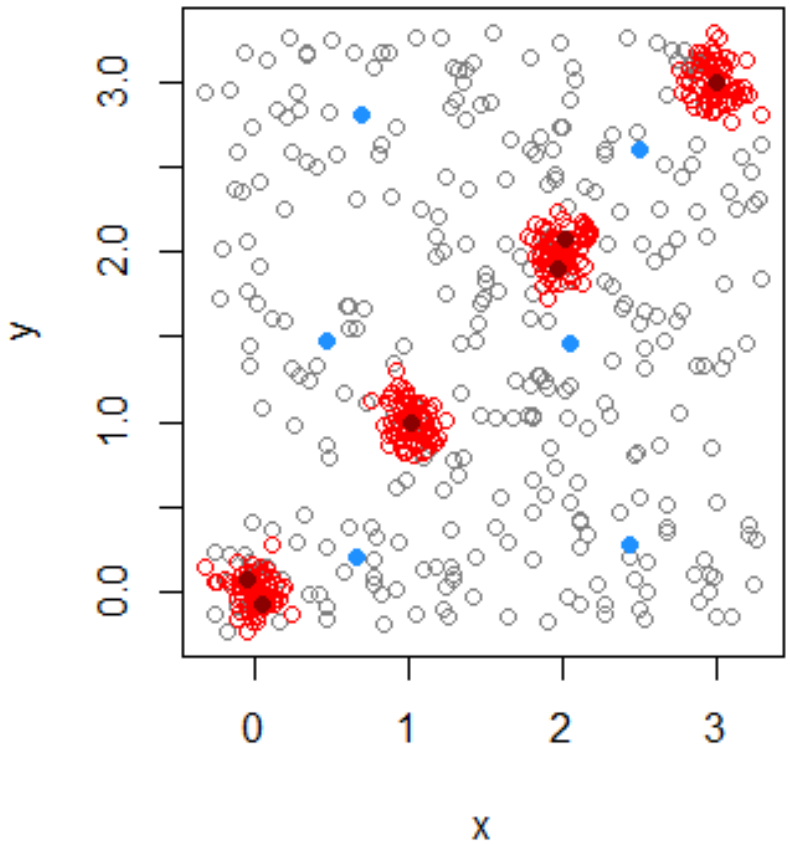
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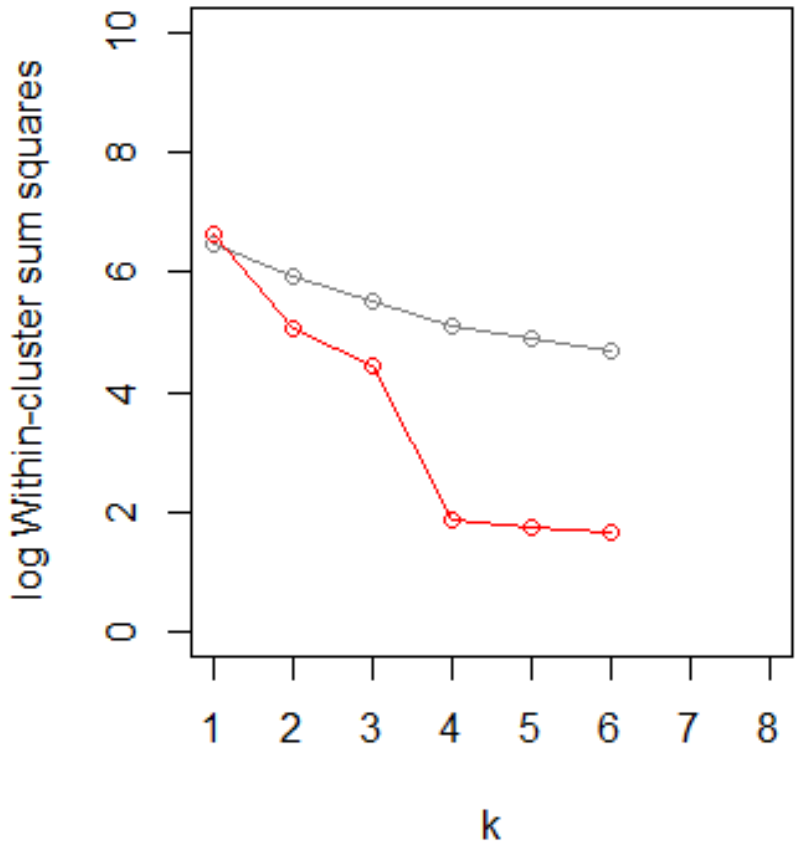
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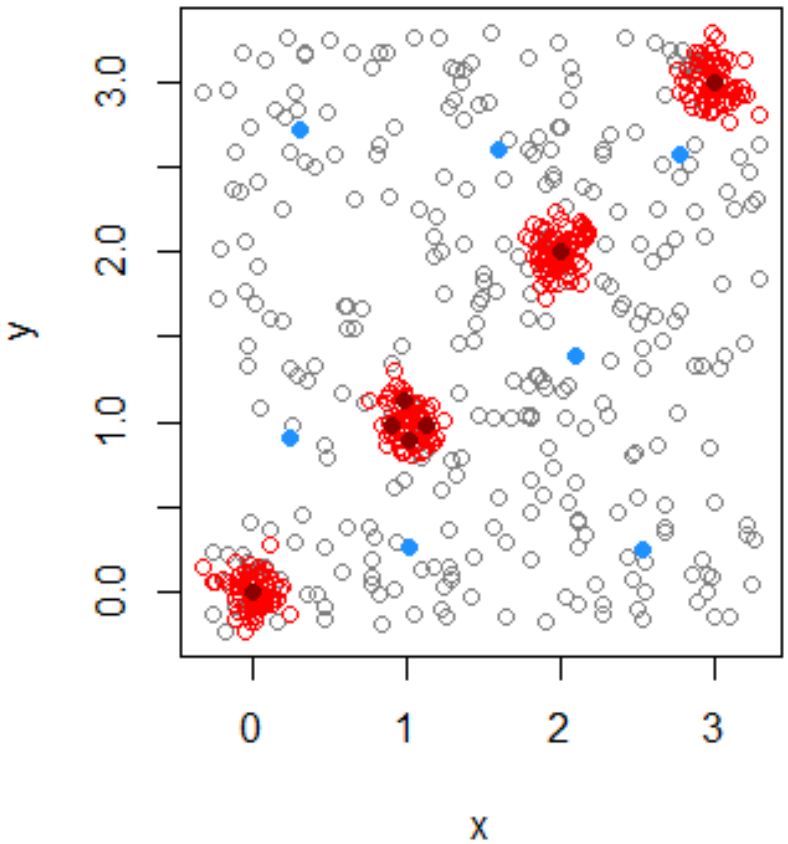
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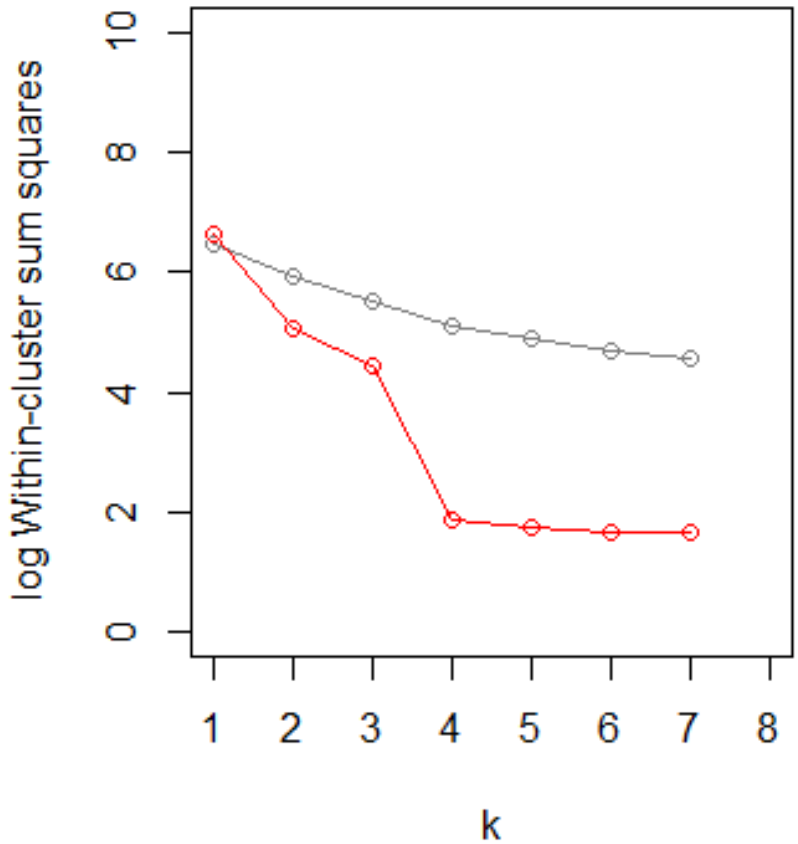
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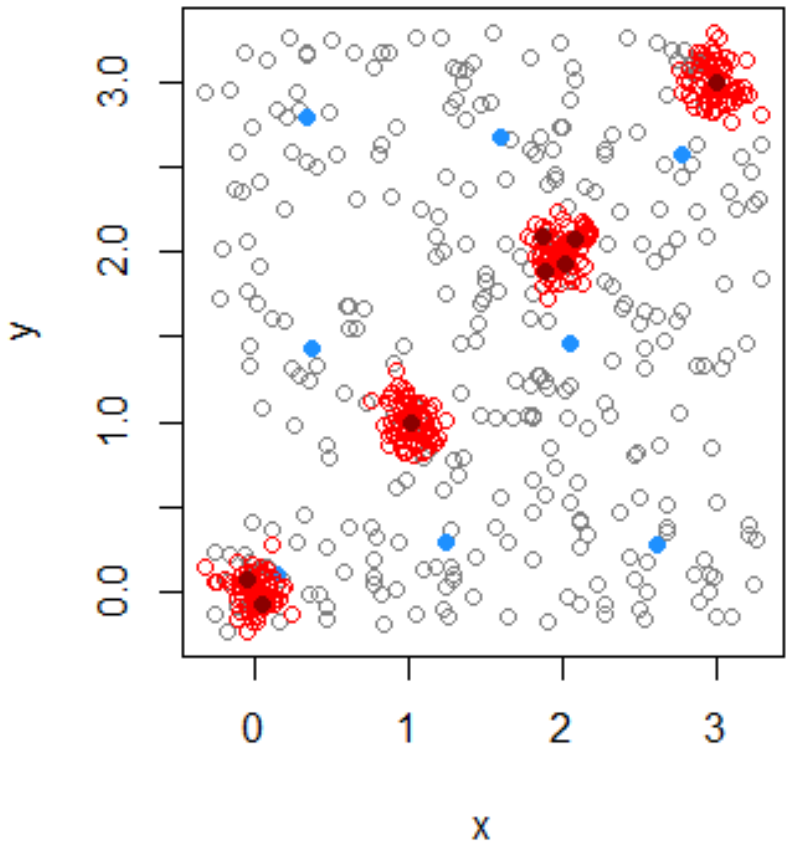
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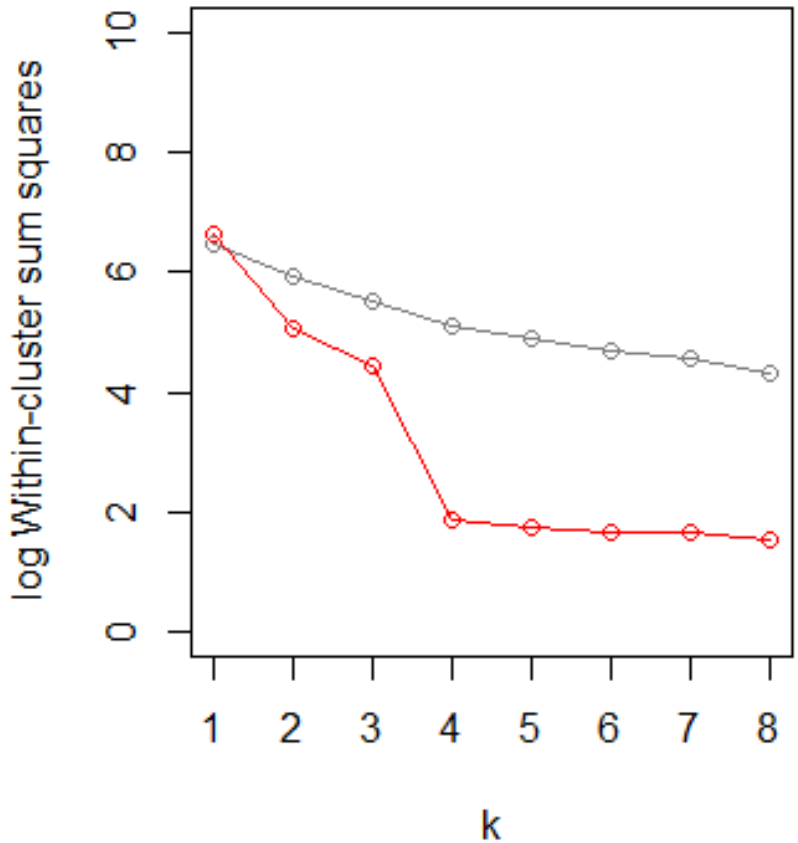
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MALLET

Why MALLET?

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- MAchine Learning for LanguagE Toolkit

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- One-stop shop for machine learning needs

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- MAchine Learning for LanguagE Toolkit
- One-stop shop for machine learning needs
- Chews through hundred of thousands of files easily

Download

`http://mallet.cs.umass.edu/`

Tutorial

https://electricarchaeology.ca/2011/08/30/getting-started-with-mallet-and-topic-modeling/

Demo

Demo

- What topics did people search for about Hillary Clinton

Demo

- What topics did people search for about Hillary Clinton
- (Data from Peterson, Goel and Iyengar 2018)

Devil's in the details...

Devil's in the details...

- What happens if I keep stopwords?

Devil's in the details...

- What happens if I keep stopwords?
- What happens if I use bigrams?

Devil's in the details...

- What happens if I keep stopwords?
- What happens if I use bigrams?
- What happens if I vary number of topics?