Occupational wage data

CLUSTER ANALYSIS IN R

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Occupational wage data

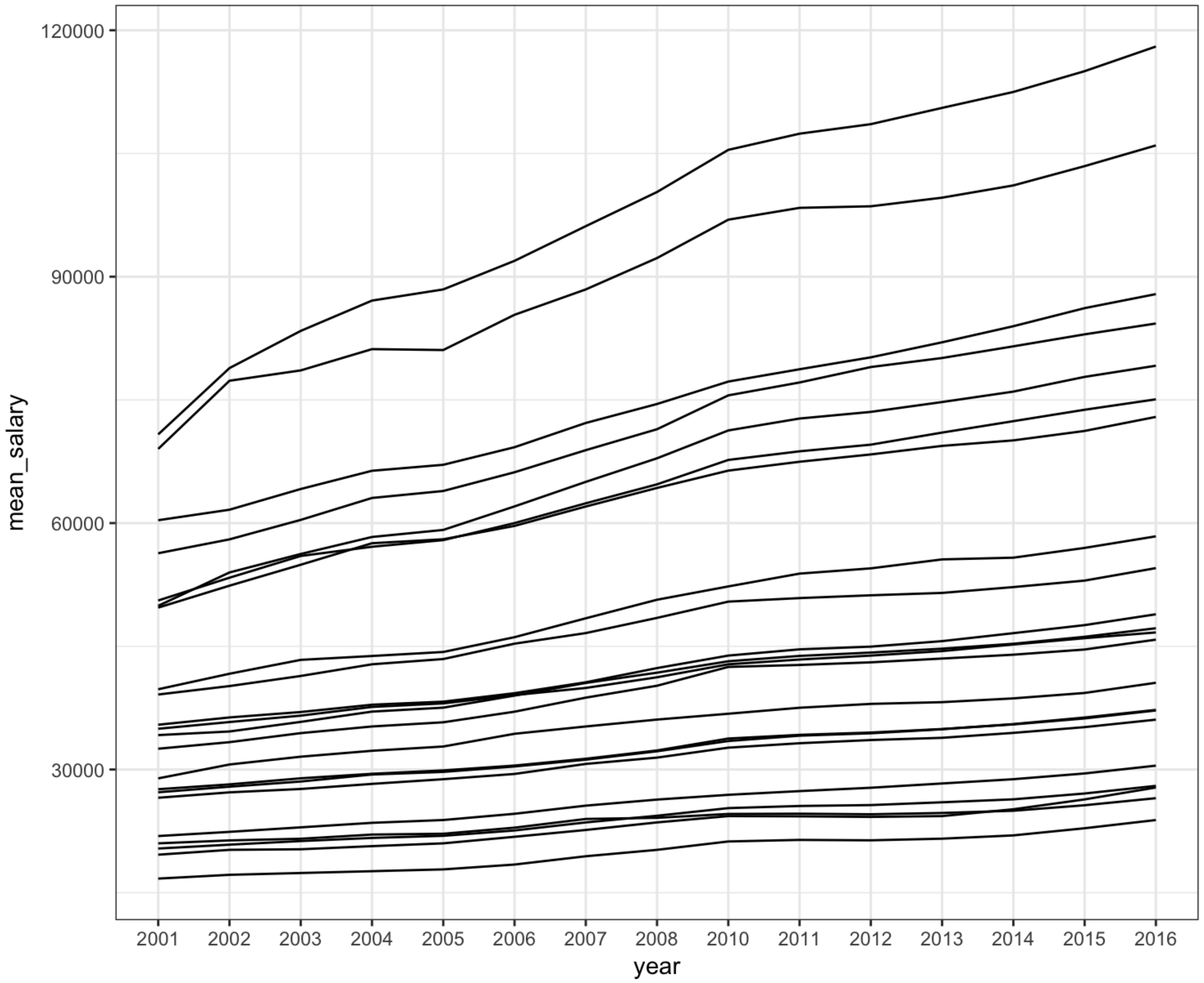
- 22 Occupation Observations
- 15 Measurements of Average Income from 2001-2016

Occupational wage data

```r
print(oes)
```

```
                             2001  2002  2003  2004  2005 ...
Management                  70800 78870 83400 87090 88450 ...
Business Operations         50580 53350 56000 57120 57930 ...
Computer Science            60350 61630 64150 66370 67100 ...
Architecture/Engineering    56330 58020 60390 63060 63910 ...
Life/Physical/Social Sci.   49710 52380 54930 57550 58030 ...
Community Services          34190 34630 35800 37050 37530 ...
...                         ...   ...   ...   ...   ...   ...
```

Occupational wage data



Next steps: hierarchical clustering

- Evaluate whether pre-processing is necessary
- Create a distance matrix
- Build a dendrogram
- Extract clusters from dendrogram
- Explore resulting clusters

Let's practice!

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Reviewing the HC results

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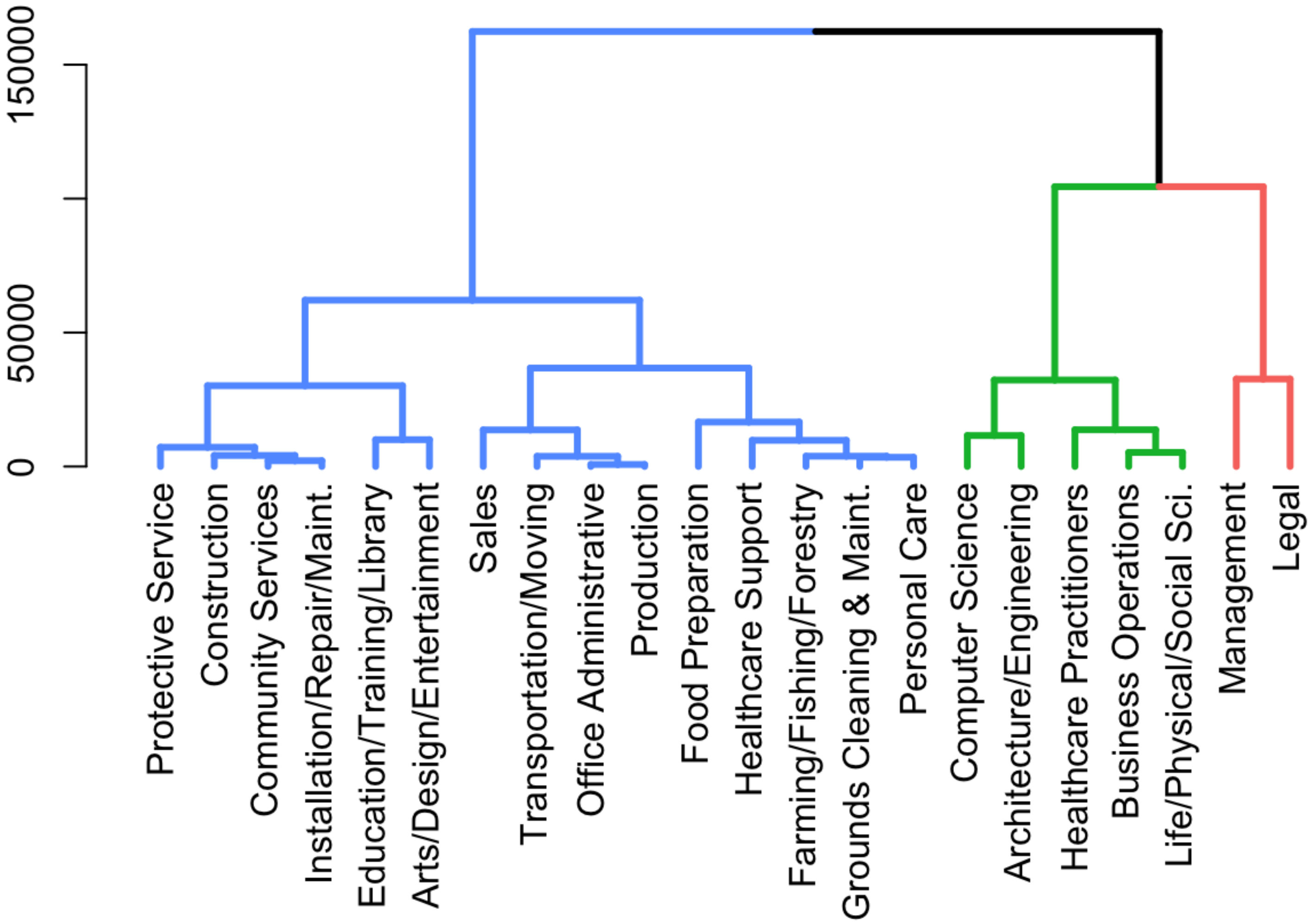
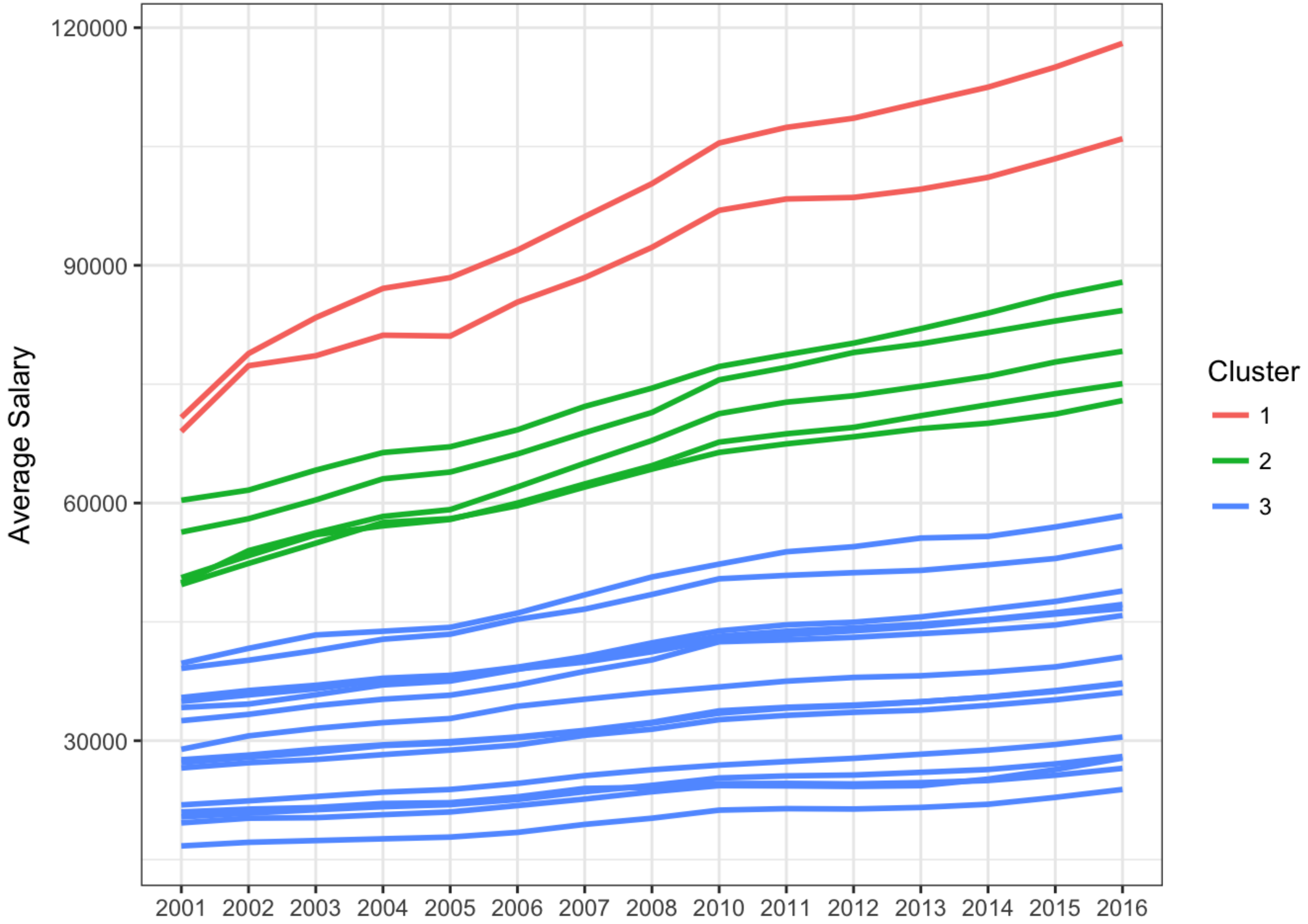
The dendrogram

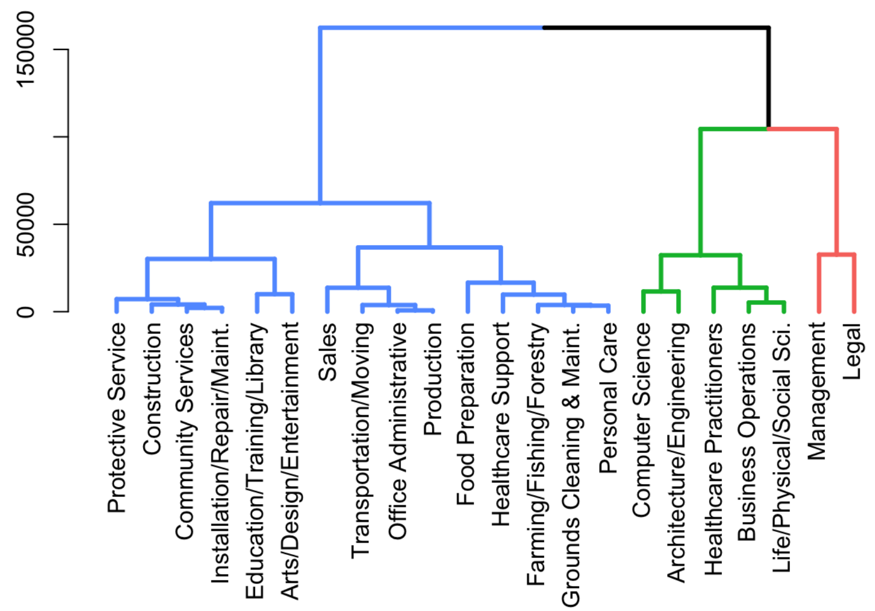


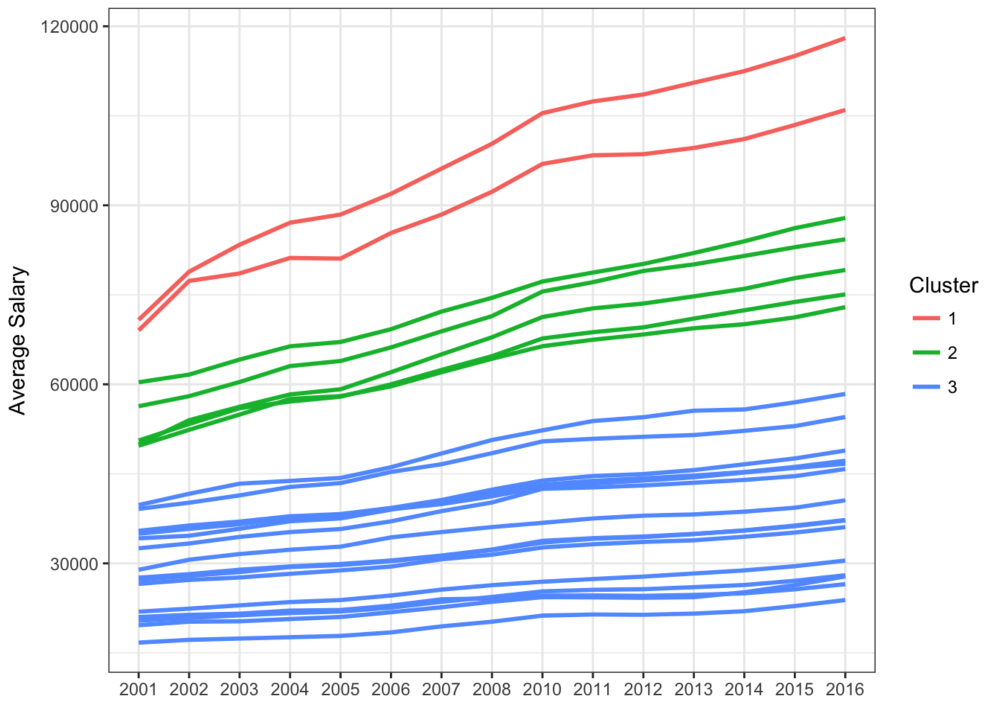
The trends



Average Salary
120000
90000
60000
30000
2001
2002
2003
2004
2005
2006
2007
2008
2010
2011
2012
2013
2014
2015
2016
Cluster
1
2
3

Connecting the two





Next steps: k-means clustering

- Evaluate whether pre-processing is necessary
- Estimate the "best" k using the elbow plot
- Estimate the "best" k using the maximum average silhouette width
- Explore resulting clusters

Let's cluster!

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Review K-means results

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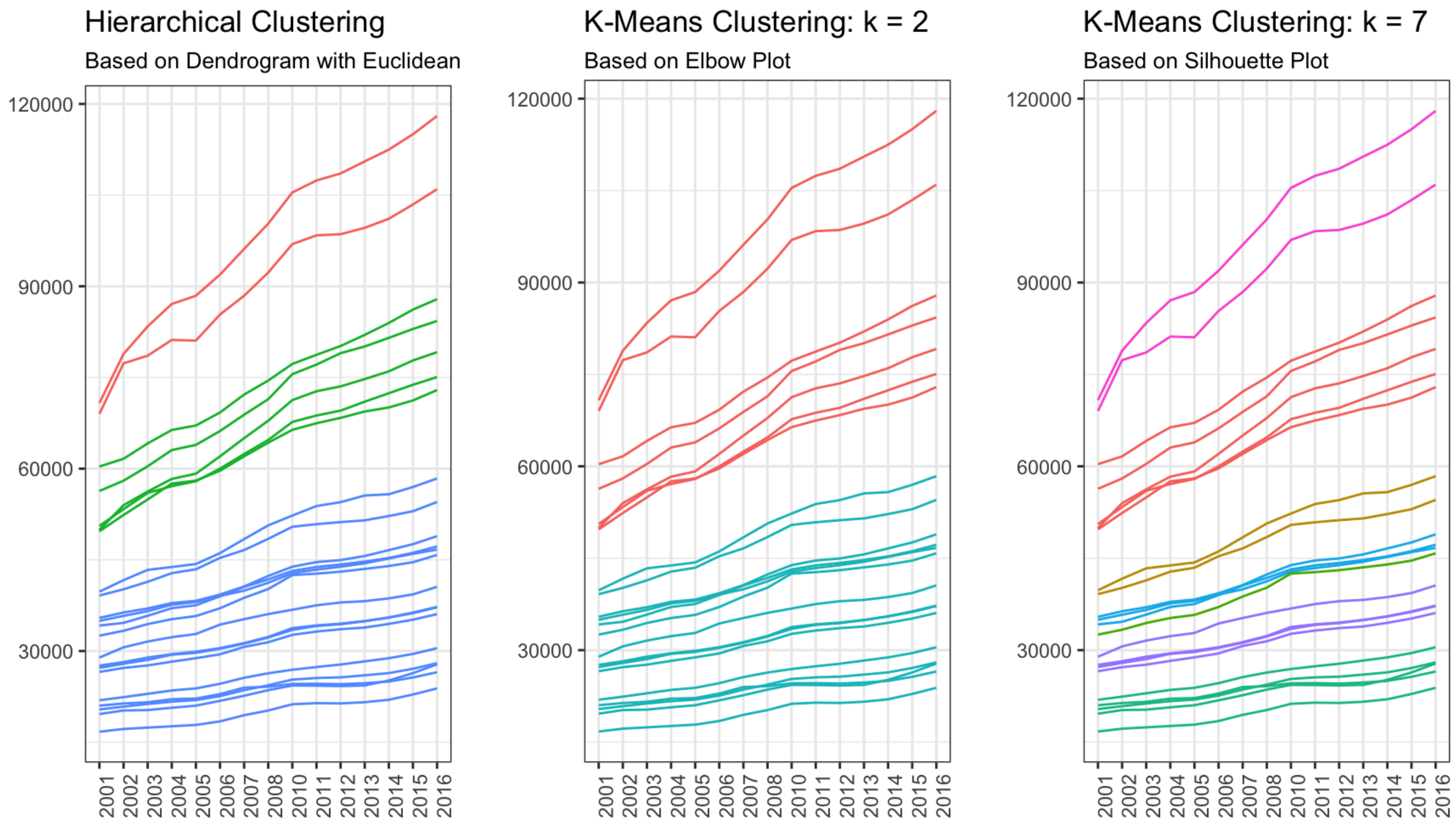
Three clustering results



Hierarchical Clustering
Based on Dendrogram with Euclidean

K-Means Clustering: k = 2
Based on Elbow Plot

K-Means Clustering: k = 7
Based on Silhouette Plot

Comparing the two clustering methods

	Hierarchical Clustering	k-means
Distance Used:	virtually any	euclidean only
Results Stable:	Yes	No
Evaluating # of Clusters:	dendrogram, silhouette, elbow	silhouette, elbow
Computation Complexity:	Relatively Higher	Relatively Lower

What have you learned?

- **Chapter 1:**
  - What is distance
  - Why is scale important
- **Chapter 2:**
  - How linkage works
  - How the dendrogram is formed
  - How to analyze your clusters
- **Chapter 3:**
  - How k-means works
  - How to estimate k
  - How to analyze how well an observation fits in a cluster

A lot more to learn

- k-mediods
- DBSCAN
- Optics

Congratulations!

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