Clustering analysis

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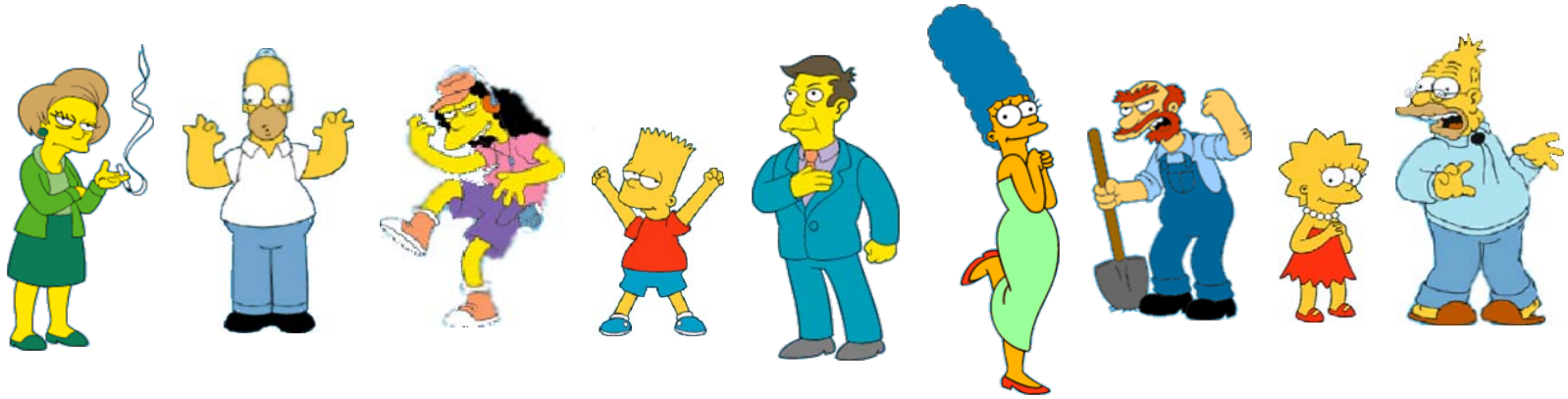
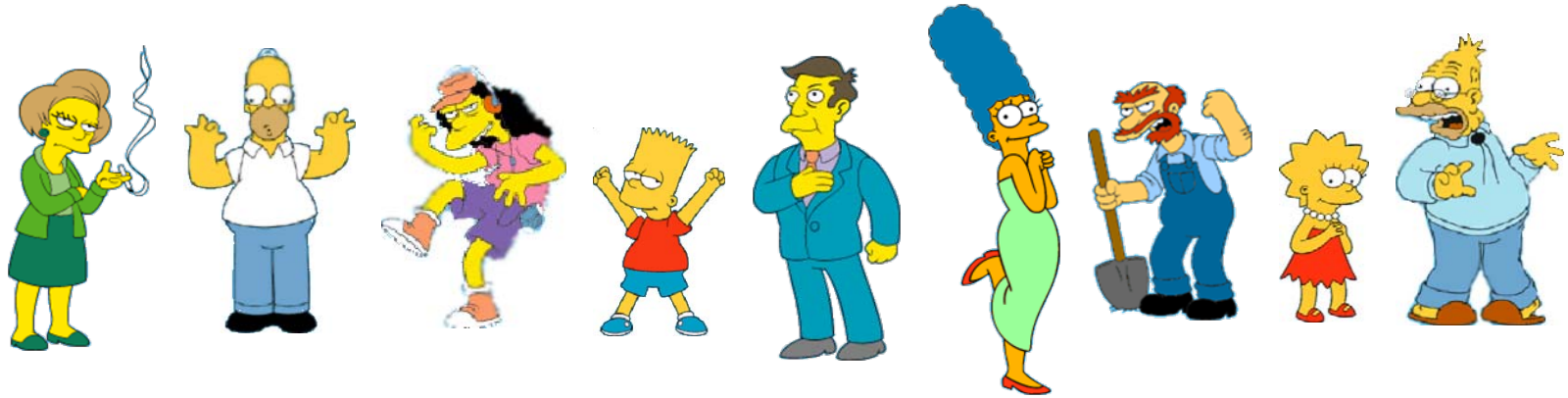
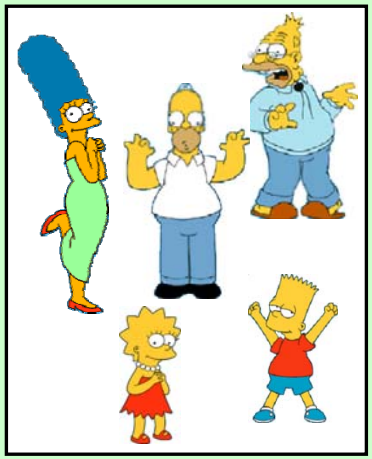
Motivating Questions for Clustering

- What is the natural groupings in a set of data?



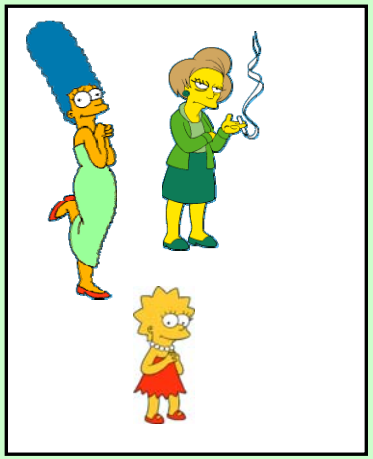
Motivating Questions for Clustering





Simpson's Family

School Employees

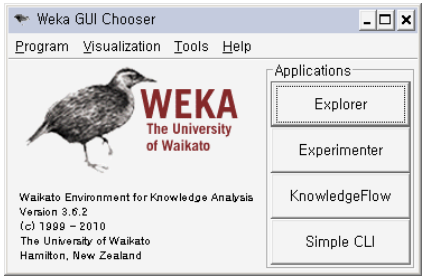


Females

Males

The way of grouping is not unique

Introduction to Weka



- Weka: Data Mining Software in Java
  - Weka is a collection of machine learning algorithms for data mining & machine learning tasks
  - What you can do with Weka?
    - data pre-processing, feature selection, classification, regression, clustering, association rules, and visualization
  - Weka is an open source software issued under the GNU General Public License
  - How to get? http://www.cs.waikato.ac.nz/ml/weka/ or just type ‘Weka’ in google.

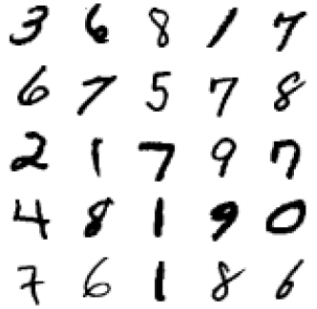
Dataset #1: Iris Flower

- Description
  - The Iris flower data set or Fisher's Iris data set is a multivariate data set introduced by Sir Ronald Aylmer Fisher (1936)
  - These were collected the data to quantify the geographic variation of Iris flowers in the Gaspé Peninsula
- Configuration of the data set
  - 4 attributes
    - Sepal length
    - Sepal width
    - Petal length
    - Petal width

Dataset #2: Handwritten Digits (MNIST)

- Description
  - The MNIST database of handwritten digits contains digits written by office workers and students
  - We will build a classifier and do clustering with the reduced set of MNIST
  - http://yann.lecun.com/exdb/mnist/

- Configuration of the data set
  - Attributes
    - pixel values in gray level in a 28x28 image
    - 784 attributes (all 0~255 integer)
  - Preprocessing for practice
    - Feature selection: 784 ➔ 400
  - Class value: 0~9, which represent digits from 0 to 9



Data format for Weka (.arff)

Header

```
@relation heart-disease-simplified

@attribute age numeric
@attribute sex { female, male}
@attribute chest_pain_type { typ_angina, asympt, non_anginal, atyp_angina}
@attribute cholesterol numeric
@attribute exercise_induced_angina { no, yes}
@attribute class { present, not_present}

@data
```

Data
(CSV format)

```
63,male,typ_angina,233,no,not_present
67,male,asympt,286,yes,present
67,male,asympt,229,yes,present
38,female,non_anginal,?,no,not_present
```

Note: You can easily generate 'arff' file by adding a header to a usual CSV text file