



# Data Mining with Weka

*Data mining and ethics*

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# *Data mining and ethics*

## **Information privacy laws** (in Europe, but not US)

- ❖ A purpose must be stated for any personal information collected
- ❖ Such information must not be disclosed to others without consent
- ❖ Records kept on individuals must be accurate and up to date
- ❖ To ensure accuracy, individuals should be able to review data about themselves
- ❖ Data must be deleted when it is no longer needed for the stated purpose
- ❖ Personal information must not be transmitted to locations where equivalent data protection cannot be assured
- ❖ Some data is too sensitive to be collected, except in extreme circumstances (e.g., sexual orientation, religion)

# Data mining and ethics

## Anonymization is harder than you think

*When Massachusetts released medical records summarizing every state employee's hospital record in the mid-1990s, the governor gave a public assurance that it had been anonymized by removing all identifying information such as name, address, and social security number. He was surprised to receive his own health records (which included diagnoses and prescriptions) in the mail.*

Reidentification techniques. Using publicly available records:

- ❖ 50% of Americans can be identified from city, birth date, and sex
- ❖ 85% can be identified if you include the 5-digit zip code as well

Netflix movie database: 100 million records of movie ratings (1–5)

- ❖ Can identify 99% of people in the database if you know their ratings for 6 movies and approximately when they saw the movies ( $\pm$  one week)
- ❖ Can identify 70% if you know their ratings for 2 movies and roughly when they saw them

# Data mining and ethics

The purpose of data mining is to discriminate ...

- ❖ who gets the loan
- ❖ who gets the special offer

Certain kinds of discrimination are unethical, and illegal

- ❖ racial, sexual, religious, ...

But it depends on the context

- ❖ sexual discrimination is usually illegal
  - ❖ ... except for doctors, who are *expected* to take gender into account
- ... and information that appears innocuous may not be
- ❖ ZIP code correlates with race
  - ❖ membership of certain organizations correlates with gender

# *Data mining and ethics*

Correlation does not imply causation

*As icecream sales increase, so does the rate of drownings.*

*Therefore icecream consumption causes drowning???*

Data mining reveals correlation, not causation

*but really, we want to predict the effects of our actions*

# *Data mining and ethics*

- ❖ Privacy of personal information
- ❖ Anonymization is harder than you think
- ❖ Reidentification from supposedly anonymized data
- ❖ Data mining and discrimination
- ❖ Correlation does not imply causation