ICDM Data Mining Contest 2007

Andreas Forsblom

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Indoor Positioning

- Determine location of people and equipment
  - "Where is the portable antigravity generator?"
- Navigation
  - Airports, supermarkets, museums, ...
  - "How do I get from here to the vintage bicycle exhibit?"
- Granularity
  - Often room level or grid level (e.g., 2x2 m grid)
  - Can also be shelf level using RFID in warehouses

Indoor Positioning Technologies

- GPS generally does not work indoors
- Classic example: Xerox PARCTAB (1995, infrared)
- RFID
- WiFi
  - Infrastructure often already exists
  - Does not require authentication/access to wireless network
  - Client hardware cheap and integrated in virtually all modern mobile devices
  - Also works outdoors
- Dead reckoning

WiFi positioning

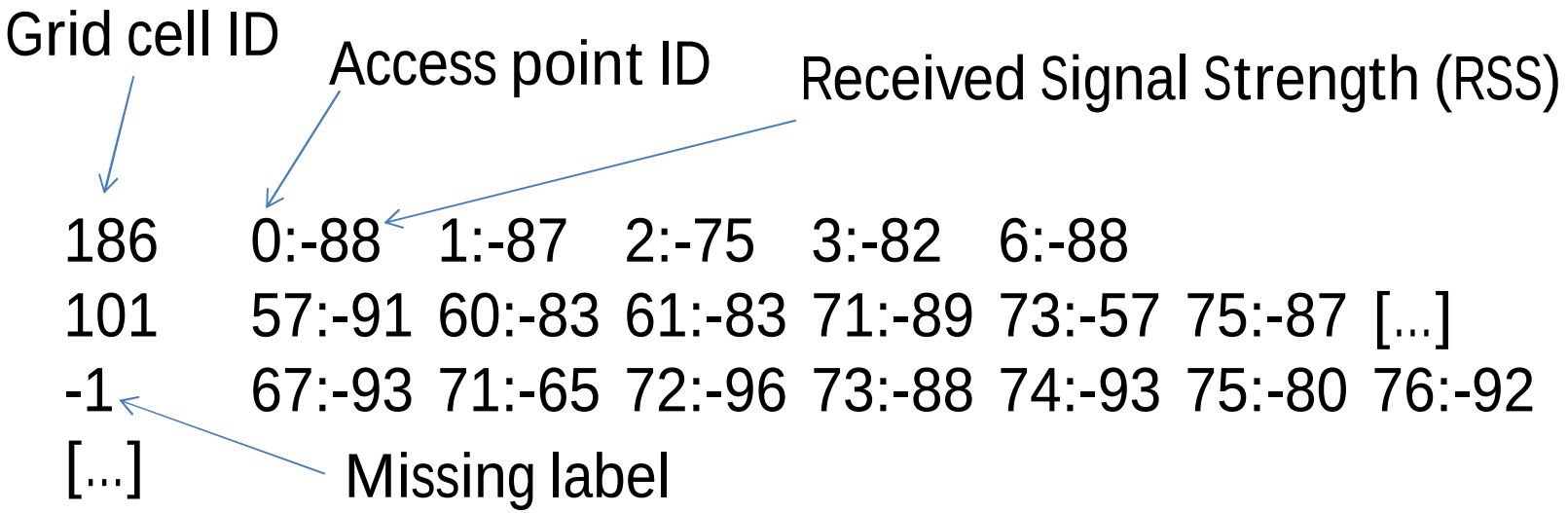
- Given a set of signal strength measurements (a “fingerprint”), what is our location?
- WiFi operates around 2.4 GHz or 5 GHz depending on implementation
  - Humans (water) particularly absorb 2.4 GHz signals and tend to move around
- Signal reflections
- Changing environment
- Same frequencies also used by other equipment => interference
- Many commercial implementations and applications
  - Android phones, Ekahau, …

ICDM Data Mining Contest 2007: Dataset

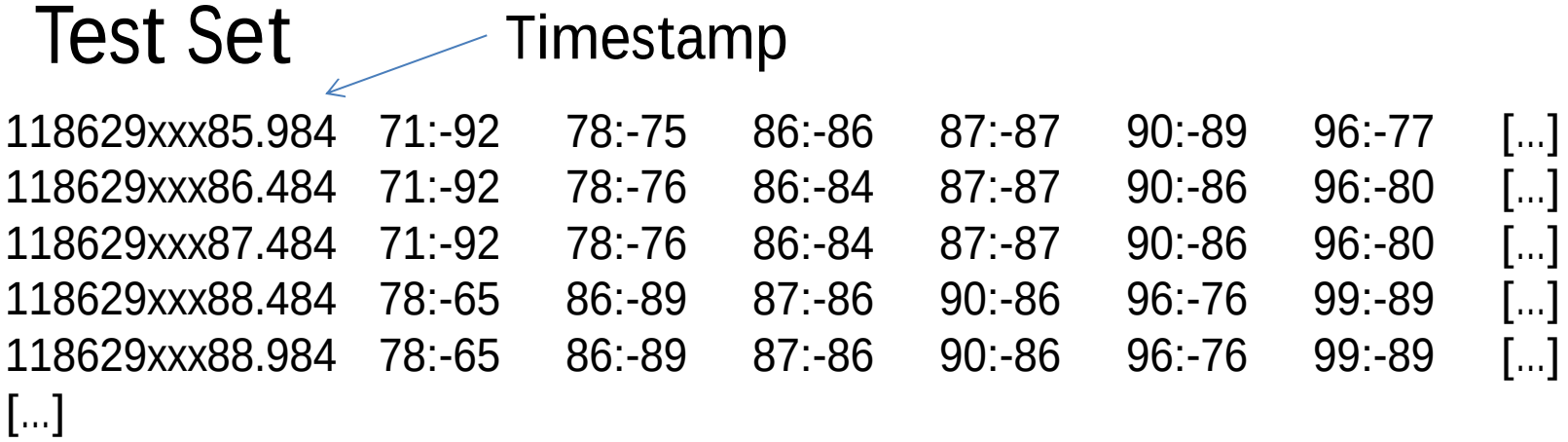
- Received Signal Strength (RSS) measurements from ~100 WiFi access points
- Dataset
  - Partially labeled training set
    - Discrete fingerprints
    - Traces
  - Unlabeled test set consisting of traces
  - 145.5 x 37.5 m area, 247 1.5 x 1.5 m grid cells
  - Collected from university building

ICDM Data Mining Contest 2007: Dataset

Training Set



Test Set



ICDM Data Mining Contest 2007: Tasks

- Task 1
  - Determine labels of unlabeled test fingerprints
  - All data collected at the same time
- Task 2
  - Determine labels of unlabeled test fingerprintss
  - No sequential training data
  - Training data collected during night, test data during day
    - Likely to be a huge difference in number of humans present
    - Less radio interference during night?

References

- Qiang Yang, Sinno Jialin Pan, Vincent Wenchen Zheng, Estimating Location Using Wi-Fi, IEEE Intelligent Systems, vol. 23, no. 1, pp. 8-13, Jan/Feb, 2008
- http://www.cs.ust.hk/~qyang/ICDMDMC07/ (Retrieved 7.2.2012)