INSTITUTO DE MATEMÁTICA E ESTATÍSTICA
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Bossa Nova – Pedestrian DNA

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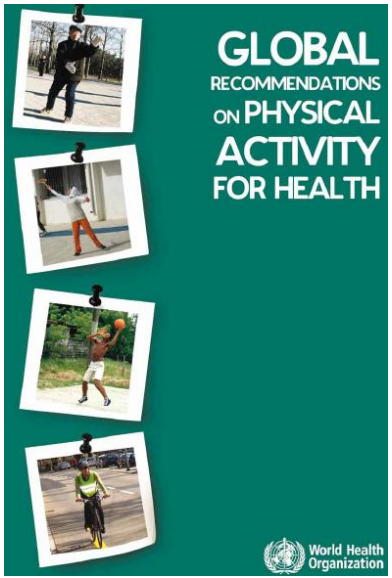
Goal

Data collection and analysis of smartphones in order to describe

Pedestrians DNA

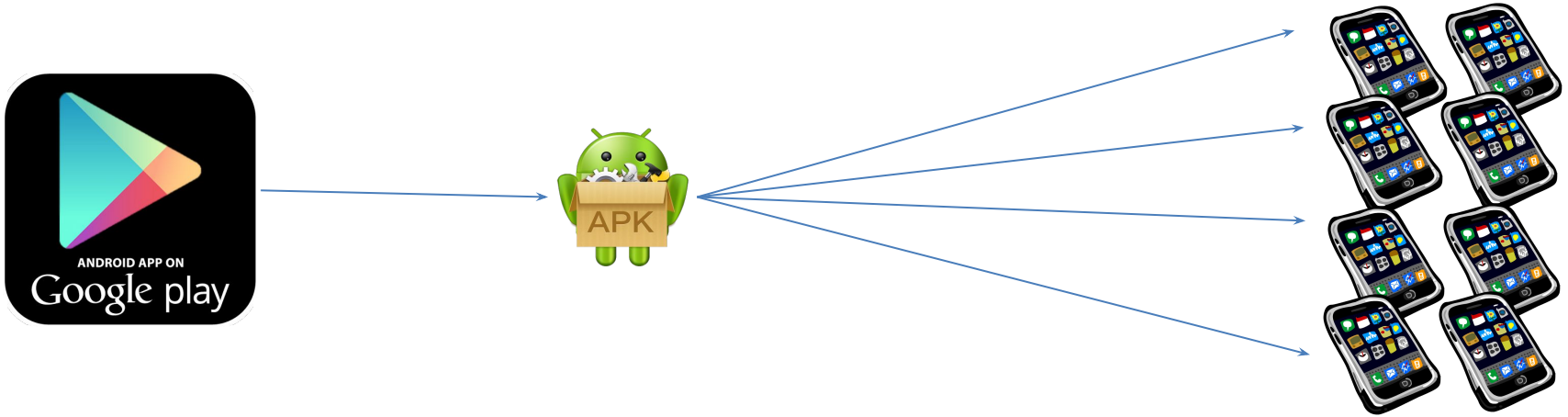
Physical activities (World Health Organization)



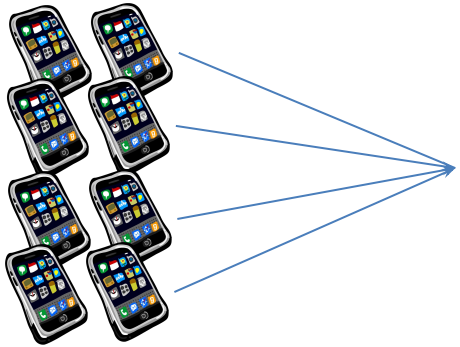
- Adults aged 18–64 should do at least **150 minutes per week**.
- For additional benefits, should increase their moderate-intensity aerobic physical activity to **300 minutes per week**.

Architecture

An application was developed exclusively for research to run in background of mobile devices

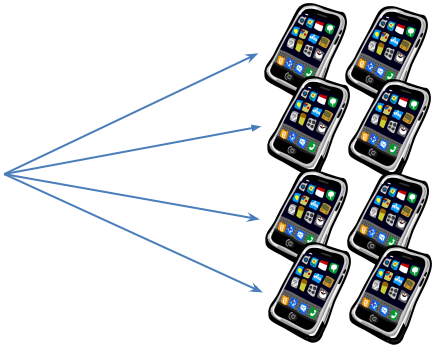


Data Diagram



Smartphone
Sensor Data

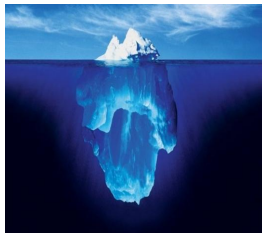
Storage,
Data Analysis

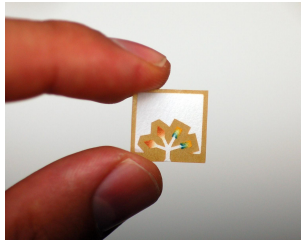


Pedestrian
DNA

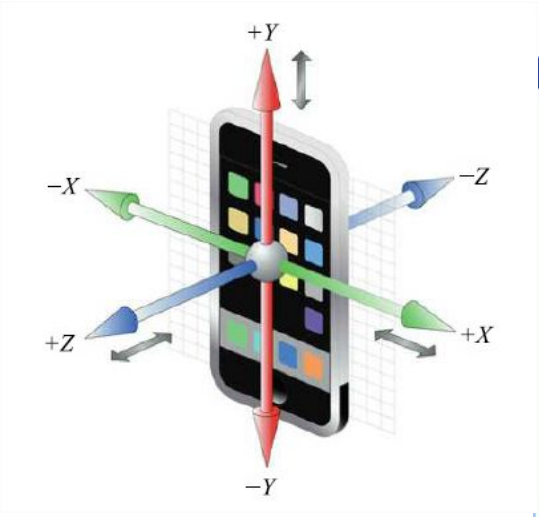
Collected Data

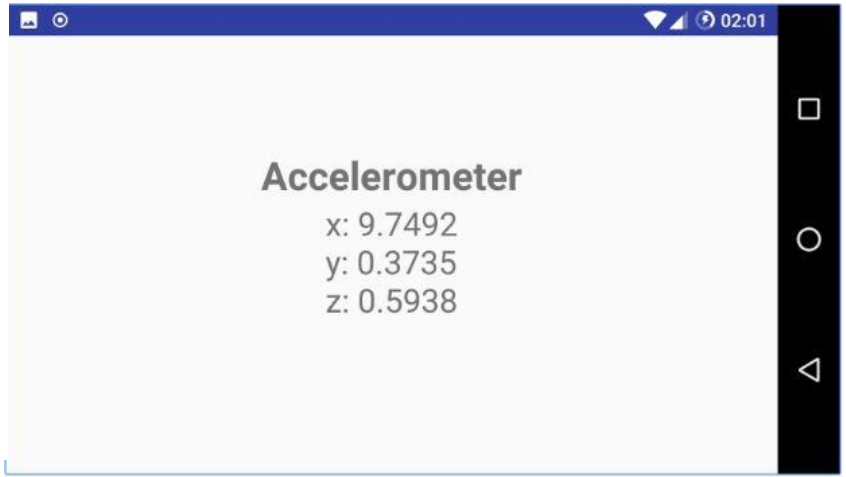
- **Accelerometer** - x, y and z axis
- **Google Fit** (number of steps, distance, running and walking durations)

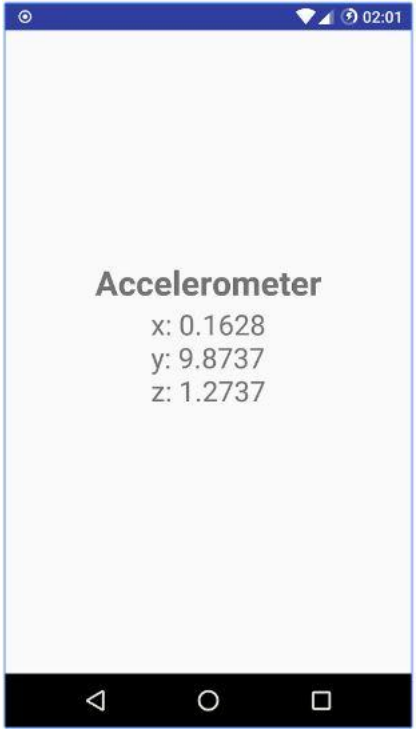




Bossa Nova APP







Accelerometer

Statistics

Daily, per person:

- 500,000 lines
- 30 MB
- Compression: 5.6 MB

Total:

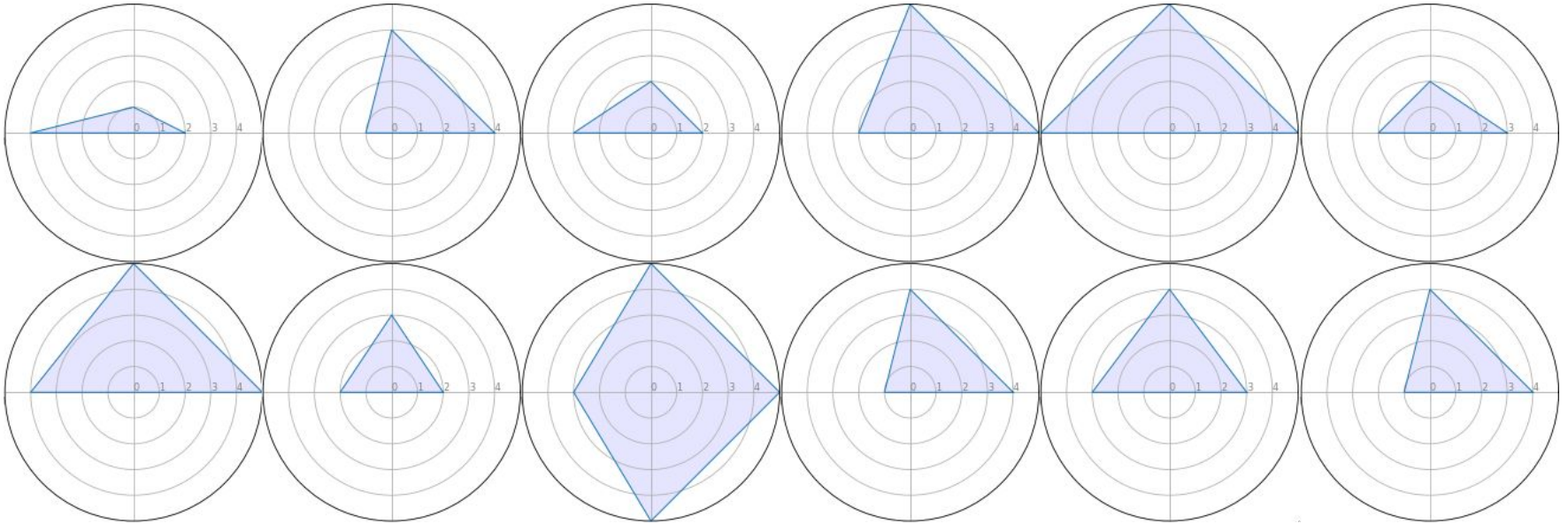
- 15 phones
- ~1 week

```
Timestamp     x,          y,          z
1517505431694,-0.19153613,0.30645782,9.720459
1517505431711,-0.15322891,0.2777274,9.662998
1517505431726,-0.12449849,0.21068975,9.710882
1517505431763,-0.19153613,0.24899697,9.605537
1517505431803,-0.15322891,0.46926352,9.691729
1517505431843,-0.23942018,0.5554548,9.720459
1517505431883,-0.18195933,0.34476504,9.653421
1517505431922,-0.20111294,0.22026655,9.624691
1517505431963,-0.22984336,0.1340753,9.586384
1517505432002,-0.076614454,0.22984336,9.634268
1517505432043,-0.24899697,0.4213795,9.691729
1517505432081,-0.076614454,0.36391866,9.730036
1517505432121,-0.29688102,0.38307226,9.624691
1517505432161,-0.11492168,0.2681506,9.701305
1517505432202,-0.16280572,0.2681506,9.672575
```

Data Analysis Method

- 4 dimensions (genes): distance, steps, running and walking durations
- Daily total
- Distribution quantiles
- Score 0-5: proportional to activity intensity

Data Analysis

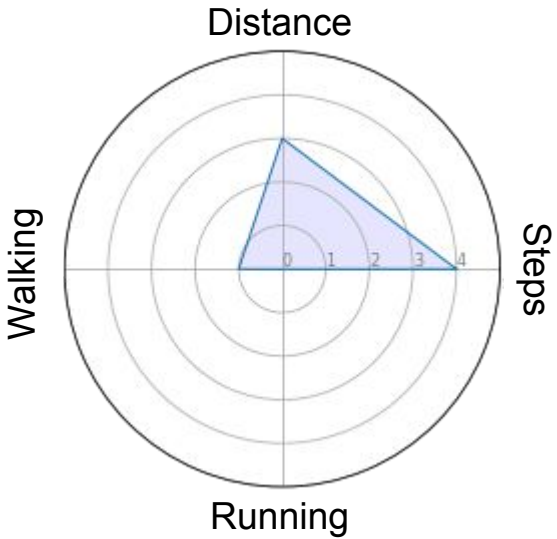


Each radar chart is the DNA of one person in one day.

Data Analysis

2018-02-07

3be557f10739f0f1



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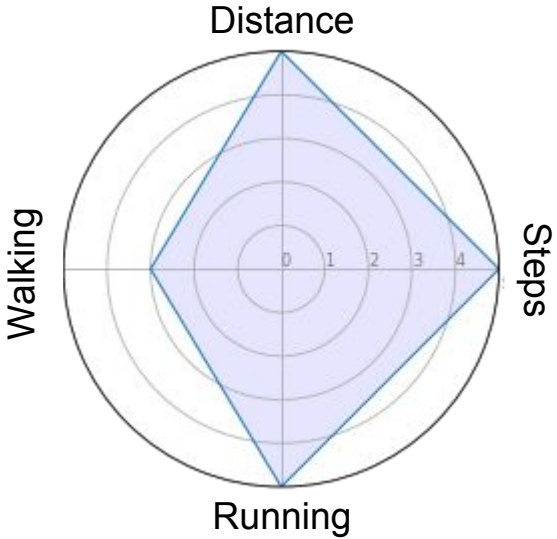

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Possibilities in Smart Cities

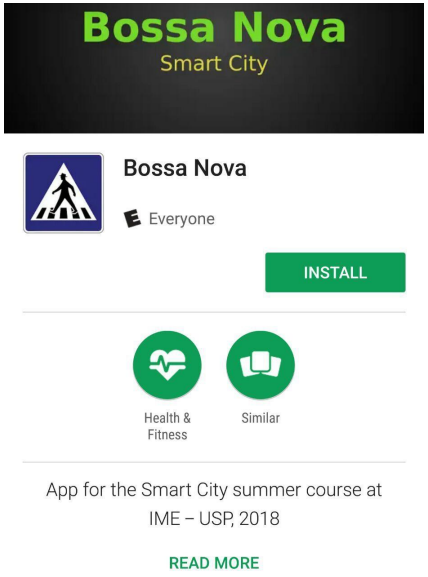
- Improvement of areas of intense pedestrian activity (zones for walking or running)
  - Greener areas, water spots, etc.

- Health care public policy for increasing physical activity
  - Improve people health by encouraging physical activity

Conclusion & Future Works

- Intuitive visualization
- Real-time DNA in mobile app
- Location-based analysis
- DNA sharing
- Different time aggregations (zoom)

How to Collaborate



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