

Smartphone-based Activity Recognition and Multi-sensor Fusion based Indoor Positioning System

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1. Introduction

Motivation

over 80% of time people spent indoors

Applications: smart health, smart home, asset management..

without mature ubiquitous Global Positioning Systems and maps for indoors

Multi sensors, e.g., built-in to smartphone enabling accurately positioning



• Where am I?

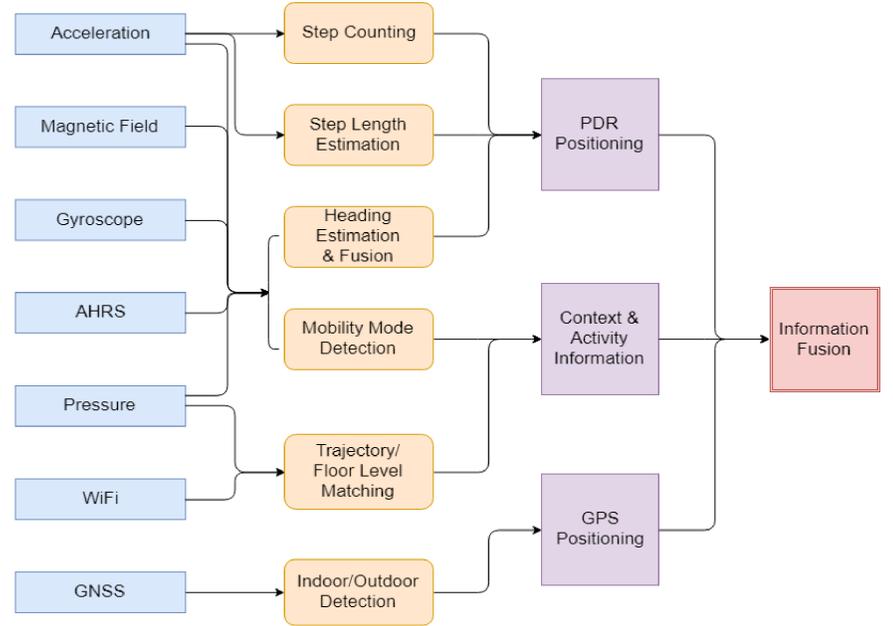
Which building?

Which floor?

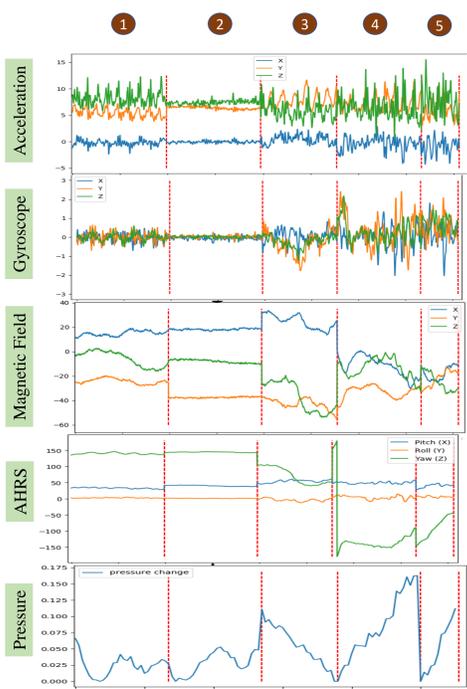
Which path?

...

2. System Framework



3. Mobility Mode Detection

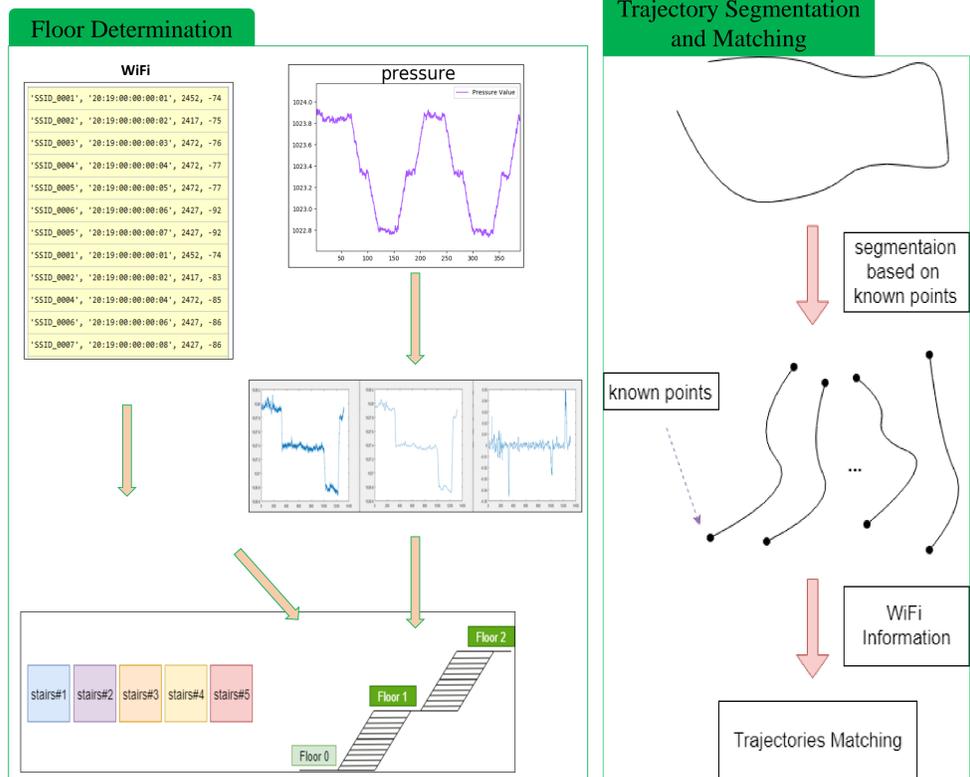


Different modes of mobility can be detected using machine learning or deep learning algorithms using multi-sensor data.

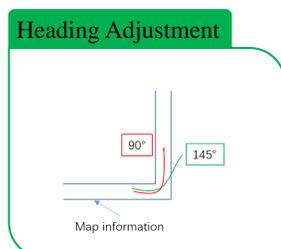
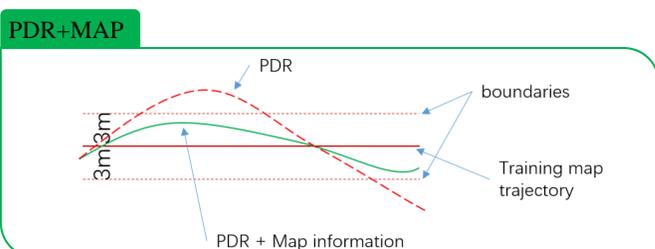
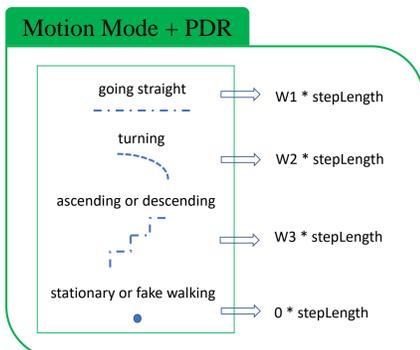
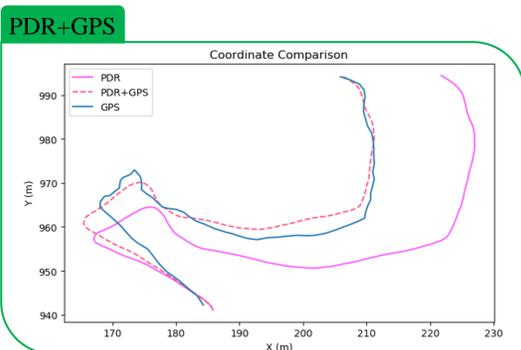
Supervised Learning Algorithms

- 1 walking
- 2 stationary
- 3 ascending (stairs)
- 4 descending
- 5 turning

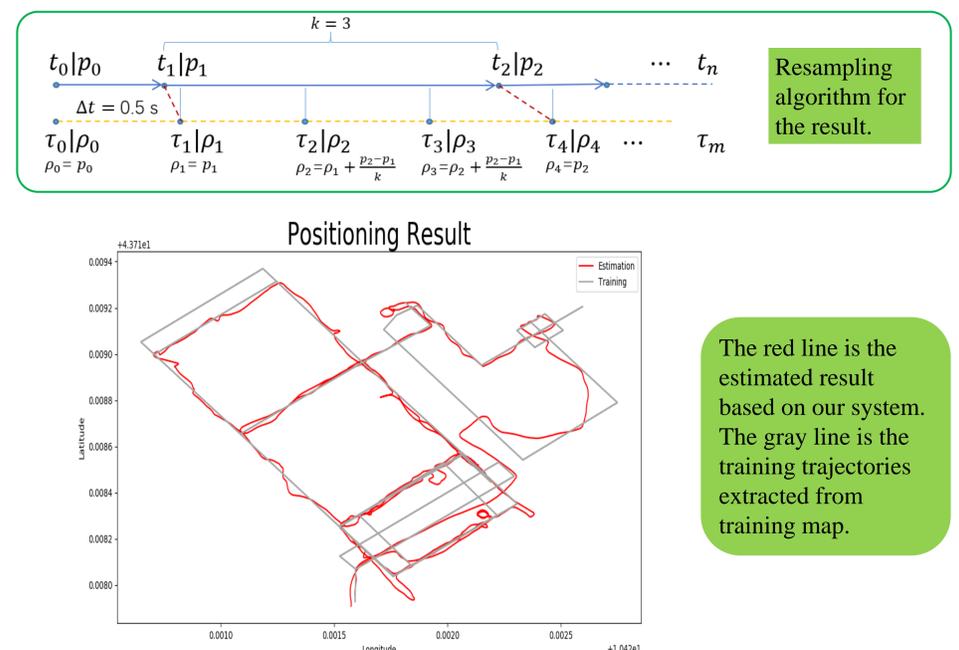
4. Trajectory/Floor ID Determination



5. Information Fusion



6. Positioning Result Display



The red line is the estimated result based on our system. The gray line is the training trajectories extracted from training map.