
HUAWEI
UK Research Centre
University Challenge 2021
Indoor positioning and navigation
HONE YOUR SKILLS AND RISE TO THE TOP
1 - 26 NOVEMBER
Online hackathon
UP TO £15.000 IN PRIZES +
Huawei devices to win

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WELCOME!

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- Introduction
- Challenge
- Technical presentations
- Q&A Session

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INTRODUCTION

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YOUR MENTORS

Chris Xiaoxuan Lu

Assistant Professor
University of Edinburgh

Firas Alsehly

Director of Position & Navigation
Huawei Edinburgh Research Centre

Francisco Zampella

Senior Research Engineer
Huawei Edinburgh Research Centre

Jesse Huang

Leader of CBG LBS
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Rory Hughes

Senior Research Engineer
Huawei Edinburgh Research Centre

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Platform support

support@isograd.com

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THE CHALLENGE

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+150 Teams

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1 Challenge

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3 winning teams

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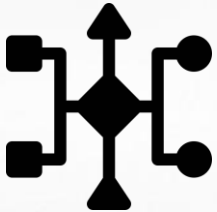
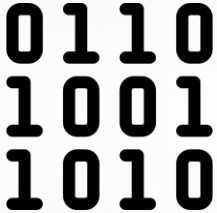
The Challenge

Team
From 2 to 3



Develop and implement algorithm



Data Set

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The Challenge

Indoor Positioning

IPS systems employ geospatial data to estimate the position of a smartphone in challenging scenarios (e.g. inside a train station). Guided Navigation - Virtual or Augmented Reality - Location Sharing Business Intelligence - Security Services – POI Search

Indoor Positioning Systems not only show the location to the user, they also improve the experience of many other applications, boosting the location context data availability, and creating the foundation for many scientific, technical, and industrial applications.

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Judging Criteria

F-Score

Precision and recall metrics combined into one scoring function, weighting the precision higher.

Finalists scoring calculated as a proportion of best performing algorithm (a score of 1.0) and the minimum accepted value (a score of 0)

Each task is weighted differently.

The first task will account for 35% of the total score, and the second task for the remaining 65%.

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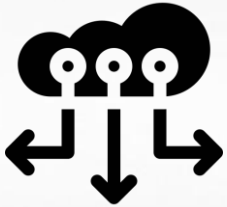
Deadlines



November 8, 2021
Registration closes

November 26, 2021
End of challenge

December 10, 2021
Winners Announcement

1st Task Solution — Open → *2nd Task Release*

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Cash Prize Pool

1st Place

£7000

\+ A Huawei Matepad Pro for each

2nd Place

£5000

\+ A Huawei Watch 3 for each

3rd Place

£3000

\+ A Huawei Band 6 for each

(Cash prizes will be divided equally between the team members)

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Join our Reddit Forum to:

- ✓ Discuss technical questions
- ✓ Find your teammate
- ✓ Dive into the IPS
- ✓ Interact with Huawei experts

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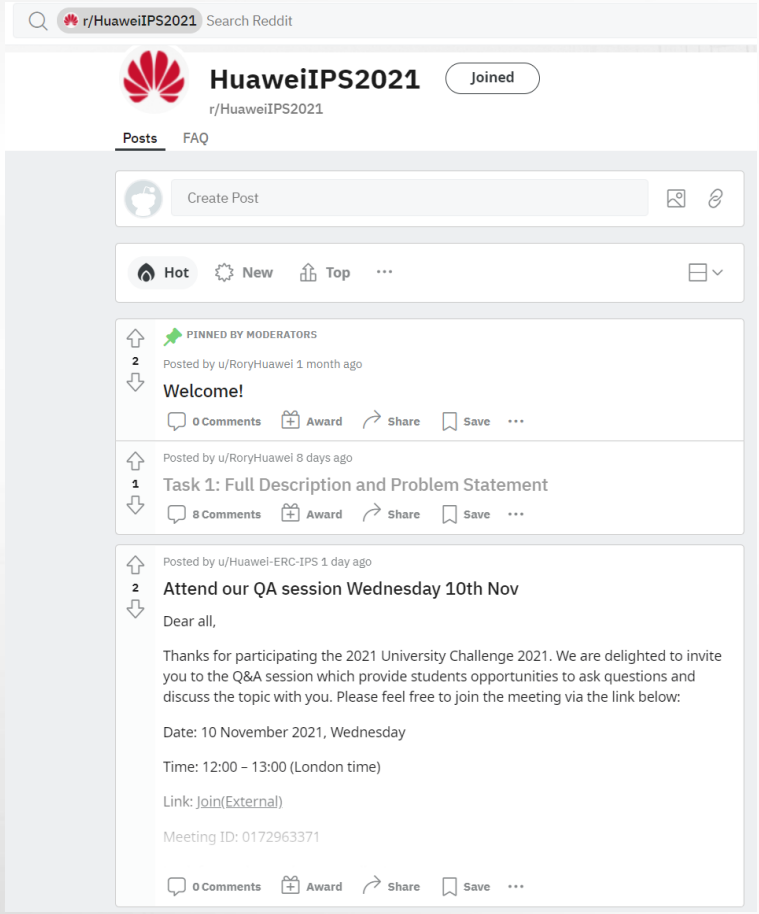
Huawei IPS 2021:

https://www.reddit.com/r/HuaweiIPS2021/



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TECHNICAL PRESENTATIONS

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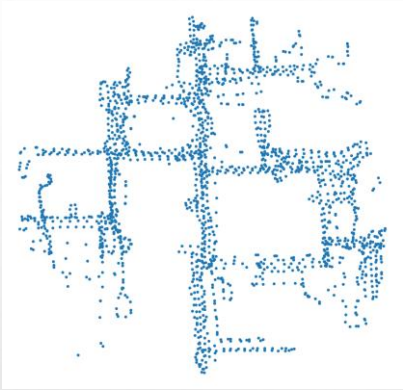
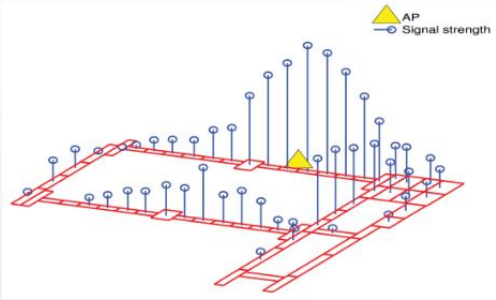
Overview

Overlay Positioning Data on maps

Radio Map (WiFi FPs)



WiFi Signal Propagation



WiFi Fingerprinting is the most common source of location context indoors

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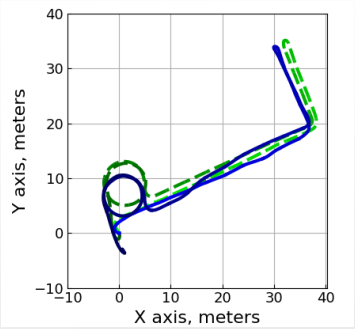
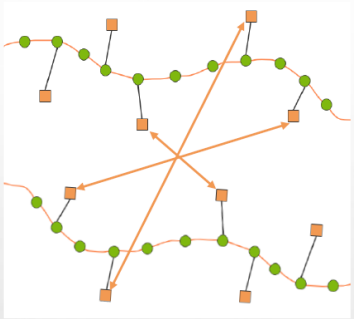
Is it a Data Science Problem?

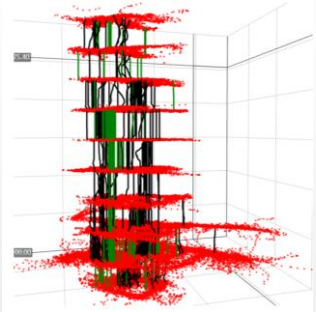
Raw Data



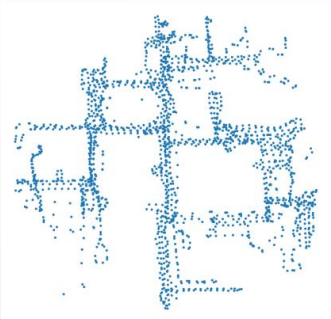
Geospatial Distance



Split into Floors



Extract WiFi FPs



Relative Phone coordinate System

Absolute coordinate System

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First level

Begin by tackling a geospatial data estimation challenge with access to labelled dataset. You will need to analyse the data and train model to predict how far two data points are from each other (indoor spaces).

In order to continue to the second level you must obtain a minimum score in the first task. Don't let it be game over for your team

35% of final score

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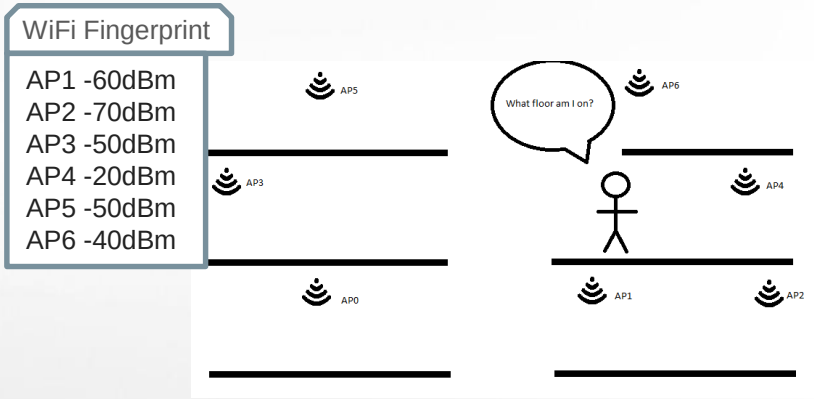
- ✓ Smartphone user is travelling in designated space in the presence of multitude of Wi-Fi emitters.
- ✓ Each emitter has a unique mac address.
- ✓ The smartphone will periodically record the **R**eceived **S**ignal **S**trength **I**ndicator (RSSI) of each detected mac (in dBm).
- ✓ Standard log-loss free-space propagation models work well in free space, but not in indoor environments with walls and other obstacles.
- ✓ The complex and locally unique properties of the Wi-Fi environment make it very useful for indoor positioning systems.
- ✓ Given a set of Wi-Fi RSSI measurements or "fingerprints" from independent trajectories, we are interested in calculating how similar they are in Wi-Fi space as this is an indication of how close they are in real space.



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Second level

The second task will be a data classification/grouping challenge where teams will create clusters of data points represent physical areas from unlabelled data.

Only the top 6 teams will be invited to the finale. Be one of the few that advance to the final level!

65% of final score

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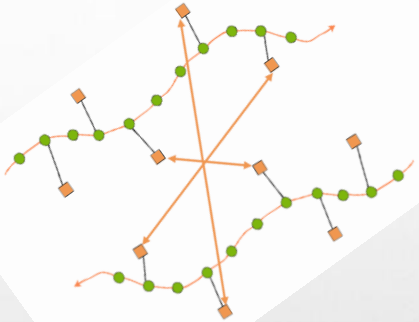
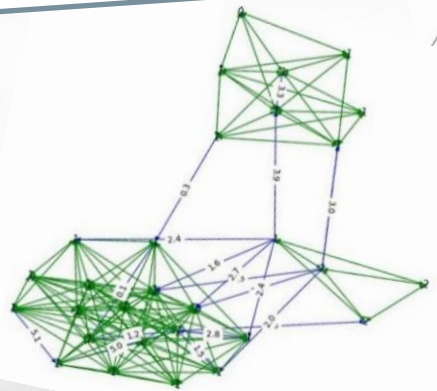
Second level

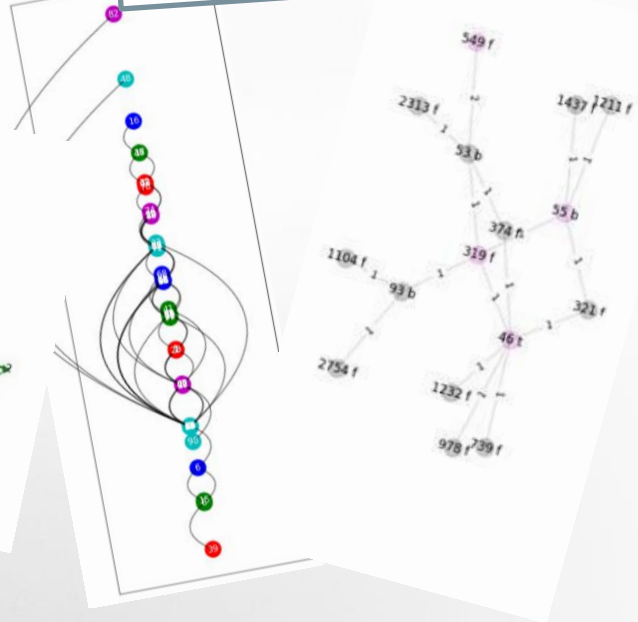
Solved the WiFi Geospatial Distances



Cluster the data into same floor groups



Verify the clusters against labeled data



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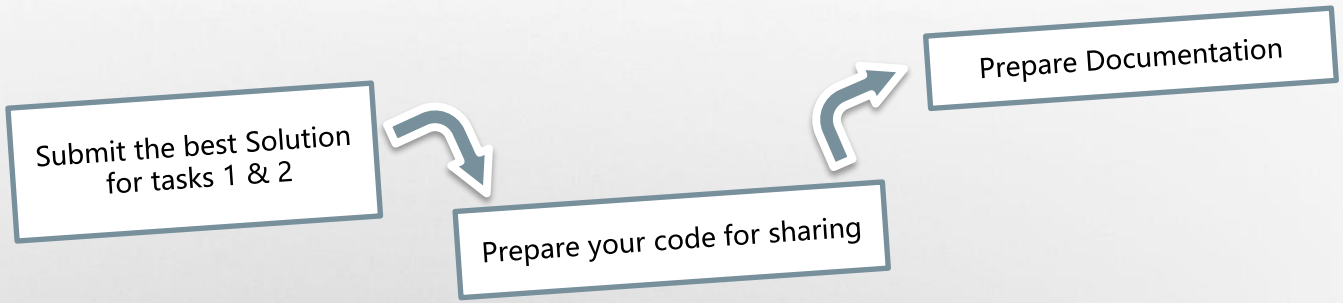
Final level

You've aced all the previous levels! Congratulations, you've made it to the last one!

Selected number of the finalist teams will be invited to present their solution in front of Huawei's jury at the virtual Award Ceremony.



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Q&A SESSION

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Good Luck!


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