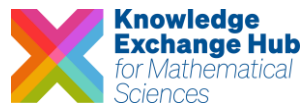


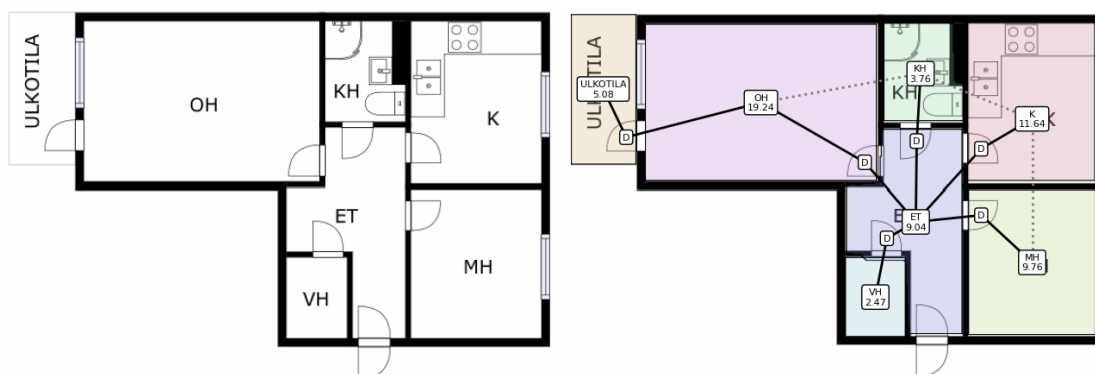
ESGI195 Challenge: Floor Plan Graph Analysis for Automated Planning Tools



This ESGI195 challenge is sponsored by IEG group (ieg4.com) and the Knowledge Exchange Hub for Mathematical Sciences (kehubmaths.org.uk)

Overview

Around 600,000 planning applications are submitted annually in the UK, and more than half require revisions due to errors. IEG Group develops solutions for local planning authorities to automate the checking and validation of these applications. One component of this system is the automatic calculation of floor areas using image recognition software. The software processes 2D floor plans using computer vision and machine learning to detect rooms, walls, and doors for the calculation of floor areas.



To improve reliability, this challenge focuses on the graph structure underlying floor plans. These graphs encode the topology of spaces and their connections, whether through shared walls or doorways. The working hypothesis is that floor plans correspond to graphs with specific structural constraints, and that these constraints can be exploited to improve the accuracy of automated detection.

Challenge Focus

The study group will investigate the theoretical properties of graphs derived from 2D floor plans and relate these to practical performance issues in the existing system. The aim is to better understand which graph configurations are valid, and how deviations from these patterns may signal detection errors.

Participants will work with a dataset of open-source floor plans alongside graphs inferred by IEG Group's software. The group will:

- Identify structural constraints and invariants of valid floor plan graphs
- Analyse common error patterns in graph extraction
- Explore how identified constraints can be used to detect and correct errors in floorplan graph recovery

Outcome

The expected outcome is a set of insights or methods that connect theoretical graph properties with practical improvements in floor plan interpretation. This may include identifying invalid graph structures, proposing constraints for post-processing, or informing model improvements to reduce error rates in automated planning application tools.