

## Software Lab:

# Emergency Floor Plan Digitalization with Machine Learning

### Description

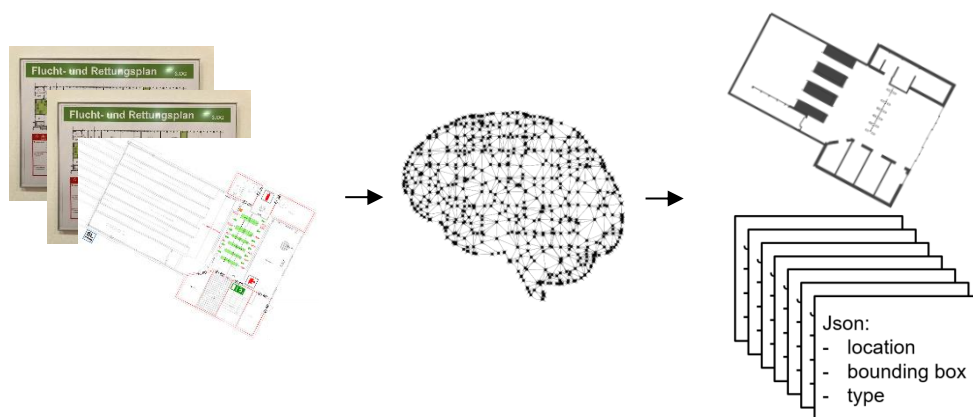
Rapidly understanding indoor environments is one of the key tasks of first responders in emergency operations. First responders can hereby be supported with novel environment mapping and path planning possibilities [1]. These tools however need a rich information input such as the availability and location of fire extinguishing tools.

Your task is the development of a tool which automatically detects location and type of different emergency symbols in emergency plans. Machine learning is one approach which have proved to provide valuable results when it comes to object detection on images [2]. Combining emergency floor plans with machine learning in order to generate valuable semantic information is the approach which shall be investigated in this SoftwareLab.

### Task

1. Generate Labeled Database:
  - Photograph/images/PDFs indoor escape and rescue plans (~1000)
2. With the support of deep learning implement a system that takes

Indoor escape and rescue plans as inputs and gives as outputs clean digitalized floor plan, current position, location of objects of interest: fire extinguisher, fire alarms, first AID/AED, emergency exit, elevator, evacuation zones, etc.



### Supervisors

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### References

[1] Chou, J. S., Cheng, M. Y., Hsieh, Y. M., Yang, I. T., & Hsu, H. T. (2019). Optimal path planning in real time for dynamic building fire rescue operations using wireless sensors and visual guidance. *Automation in Construction*, 99 (November 2018), 1–17.

doi:10.1016/j.autcon.2018.11.020

[2] Kim, Hyunjung & Kim, Seongyong & Yu, Kiyun. (2021). Automatic Extraction of Indoor Spatial Information from Floor Plan Image: A Patch-Based Deep Learning Methodology Application on Large-Scale Complex Buildings. *ISPRS International Journal of Geo-Information*. 10. 828. 10.3390/ijgi10120828.