# Military planning

*a very motivated bachelor student can ask for these topics too, but needs data science courses background

**Automatic detection of unit symbols in military plans (MSc)**

Military plans contain a textual description of the plan, accompanied with plans drawn on plastic films, containing unit symbols and tasks to be performed. These films can be overlaid on a map and give spatial understanding of what is planned to happen.

Friendly unit symbols have a standardized rectangular shape and contain many pieces of information, such as type of unit (infantry, anti-tank, air defense, etc. ), its capabilities (mechanized?), size, affiliation (which task group, which army, etc) and so on.



The goal of this study is to automatically localize unit symbols on a scanned image of a film containing the military plan. After localizing, the identity of the symbol must be detected, meaning all the pieces of information about unit size, type, etc.

Exploratory studies done in Neural Networks course projects in spring 2023 revealed the most likely successful path would be to localize unit symbols on the film using YOLO type network, but not differentiate between unit types with this tool, because there are too many combinations that can exist. YOLO would only output where unit symbols are, after which each symbol would be "cut out" and its components would be revealed by subsequent methods (machine learning or handcrafted).

The goal of the thesis is to create such prototype. The scientific study comprises of comparing the approaches or architectures to solve the task (e.g. CNN vs transformer architecture, single network or many), selecting metrics and quantifying the results and characterizing the cases where the system fails (error analysis). Importantly, the real plans, drawn by hand by officers can have very messy content, failing in certain detections might be due to bad data, not a bad model. Giving feedback where the military should pay attention and draw cleaner, is also an outcome.

The work would be done in collaboration with the Military Academy. There will proabbly be no restrictions for non-NATO member citizens as this is an exploratory study.