# Automation of Tunnel inspection with deep learning

Starting Situation

Every year 4700km of new tunnels are built, amounting to a total annual growth value of 7%. Until today, tunnel assessment is mostly based on a slow and subjective human inspection process. As the total length of tunnels which must be inspected is constantly increasing, it becomes more and more important to guarantee their operation reliability with safe and cost-efficient means.

Project Goals

Amberg Technologies has developed in partnership with LeanBI a new platform for tunnel inspections based on Artificial Intelligence. The new platform achieves higher degree of automatization, by applying deep learning models for image segmentation.
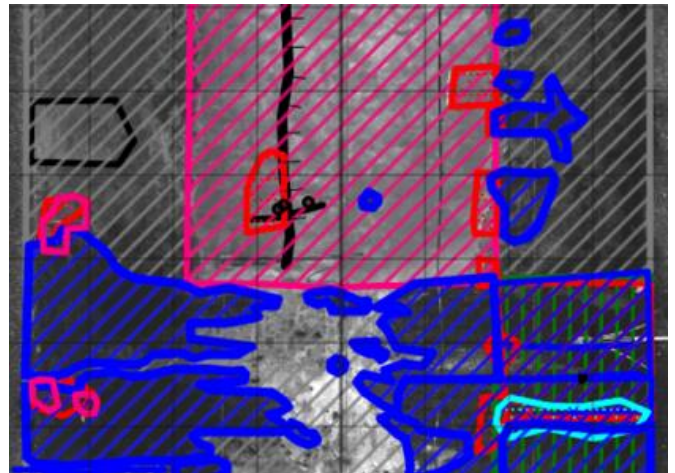
Customer Benefit

Automatic defect detection for tunnels has several advantages. Firstly, it provides a more objective and quantifiable approach to the task of tunnel inspection. This is important, as today's manual inspection is inherently subjective, increasing the variability of results between different inspectors, or even variability of annotations by the same inspector at different times. The effect is more prevalent in assessing the gravity of difficult anomalies, such as cracks of arbitrary size and shape. Furthermore, while manual visual inspection of kilometres of scanned tunnels might need tens of hours of working time, it only takes a few minutes for a trained deep learning model to annotate the same number of images.

Solution Approach

- Proof of Concept: Is principle of deepl learning applicable for tunnels?
- Determination of the best algorithm for deep learning. Take into account also transfer learning. Show feasibility on simple tunnel structures
- Optimize on more complex tunnel structures. Increase the accuracy of detection.
- Implement the models into the Amberg software