

# AI and UAVs as a transportation infrastructure monitoring assistant

(Athens, May 2019) Transportation infrastructures, e.g. roads, bridges, tunnels, are subject to frequent inspections for damages or defects. This is mainly achieved through visual, on-site inspection, performed by an expert; a tedious, time-consuming and prone to errors approach. Current trends in artificial intelligence (AI) and unmanned aerial vehicles (UAVs) can support a smooth inspection process, using low cost drones, RGB cameras, automated detection algorithms and remote operation.

Nowadays, the inspection, assessment and maintenance of civil infrastructures are mainly performed through manual visual observations by inspectors. Aside from being time-consuming, using the manual approach also serves as an invitation for human error. Additionally, a typical infrastructure inspection requires a lot of man-hours, hands-on inspection and can be very slow and, therefore, expensive. AI (and more specifically deep learning) is well suited for complex environments monitoring and can help make inspections faster, cheaper, safer and more efficient. More specific, state-of-the-art computer vision and machine learning tools is able to automatically track the degradation of the concrete infrastructures and determine their safety, via combining image processing methods and nonlinear deep machine learning algorithms, which emulate human's brain activity in understanding complex patterns. Consequently, deep machine learning is incorporated to automatically find more complex feature structures through the exploitation, for example, of Convolutional Neural Networks (CNNs), so as to improve the identification accuracy.

UAVs is another trend with many practical applications and clear advantages over the traditional inspection process. Instead of closing down nearby roads and sending an inspector up into an expensive snoopers truck to create detailed drawings on documents, a drone can get into spots where inspectors cannot access at all, record high-resolution video and shoot several high-definition quality photos. Furthermore, UAVs can significantly reduce time spend, providing at the same time an effective tool for the accurate detection of anomalies that have to be immediately taken into account. Finally, future inspections can be carried out using the exact same shooting conditions, giving the experts the ability to make reliable comparisons and track the degradation of the infrastructures; e.g. the evolution of certain concrete cracks and the generation or expansion of rust on the metal parts of the structures.

Visual observation, either manually, automatically or hybrid approach, is a mandatory for road infrastructures. PANOPTIS project uses state-of-the-art techniques so that to determine the safety of existing infrastructures, aiming at increasing the resilience of the structures and ensuring reliable network availability under unfavorable conditions, such as extreme weather events, landslides and earthquakes or other hazards. In the end, PANOPTIS will provide to the operators multiple tools, able to support efficient monitoring of the infrastructures.

Additional information can be found in PANOPTIS site link: <http://www.panoptis.eu/>



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