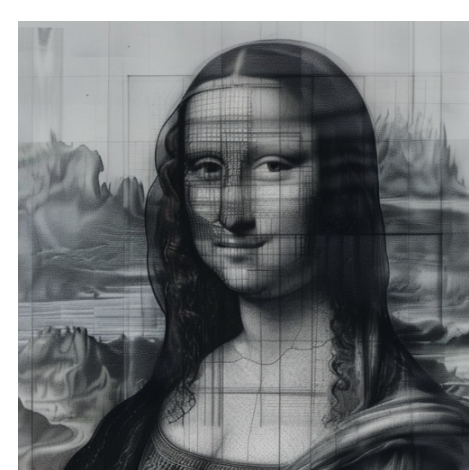


AI in art analysis



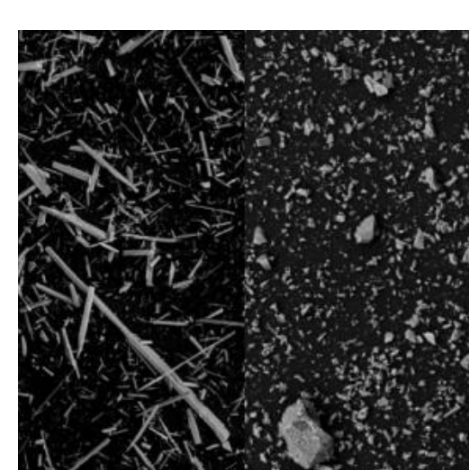
The thesis deals with the use of artificial intelligence in the analysis and restoration of art objects. The project will use machine learning and deep learning methods to gain a better understanding of how the artwork was created. The result will be a set of methods that aim to help preserve cultural heritage.

Space-time video super-resolution



The quest for high-quality video content necessitates the advancement of techniques to improve both spatial and temporal resolutions. Traditional methods often falter in enhancing detail and fluidity simultaneously. This Master's thesis will use an innovative approach to Space-Time Video Super-Resolution.

Segmentation of complex particles in EM



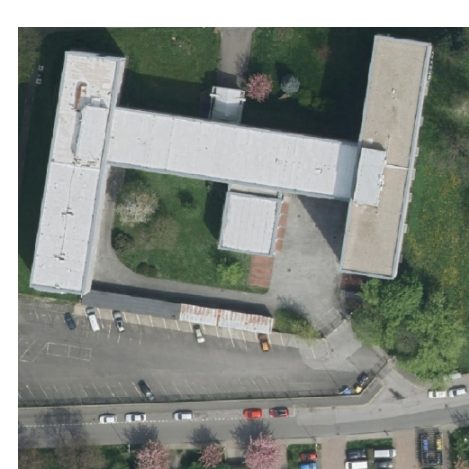
In particle analysis, the statistics of various shape variables must be determined, and this requires automatic segmentation. The student will be introduced to the problem of instance segmentation using deep NN. The goal will be to propose a method to segment particles of different shapes.

CV intelligent robotic arm system



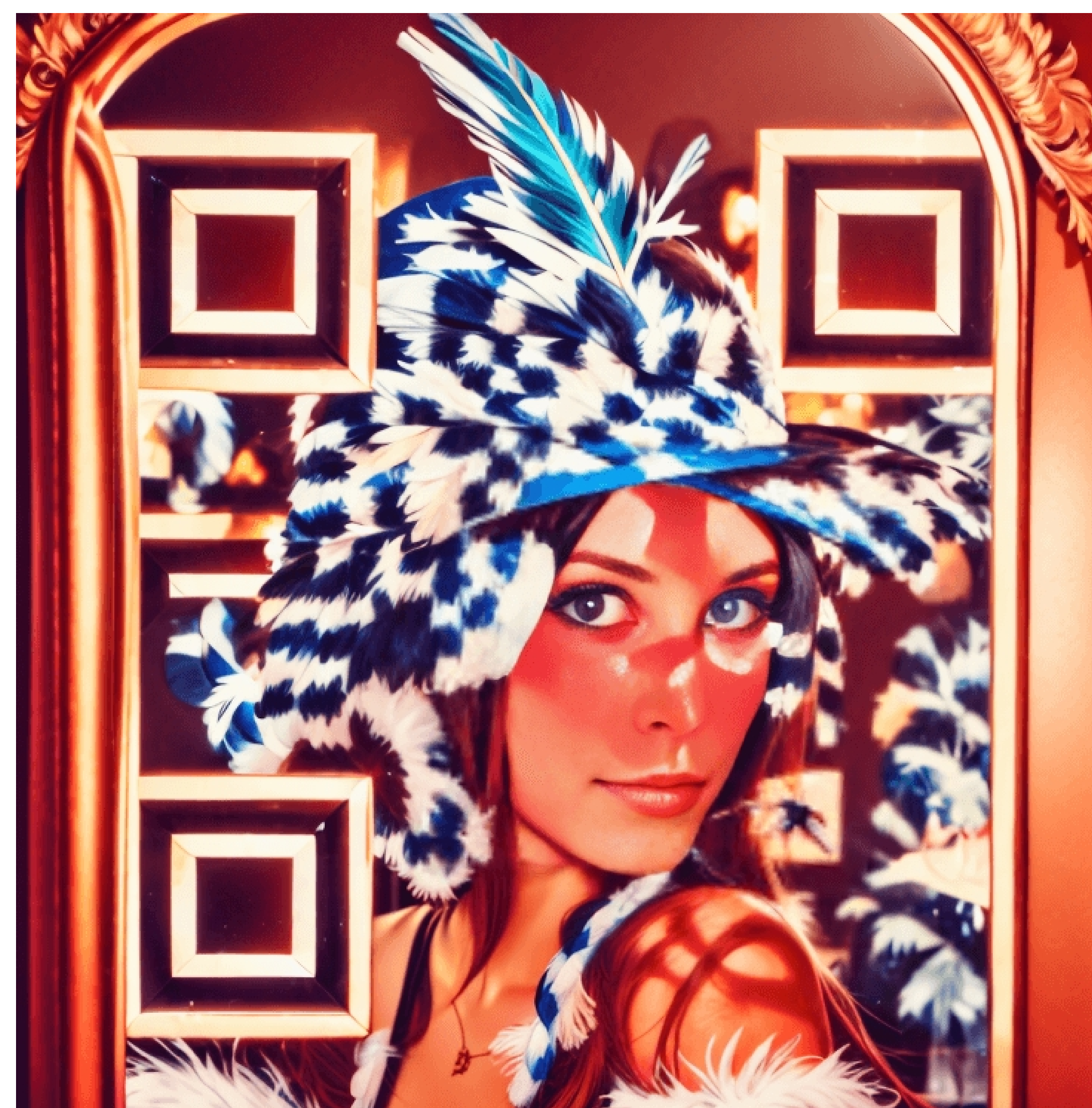
Developing an intelligent robotic arm system enhanced with computer vision technology designed to perform tasks accurately by recognizing and manipulating objects. The system analyzes visual data by integrating advanced machine learning algorithms and controls the robotic arm's movements.

Remote sensing from aerial photography



High-resolution aerial images are widely accessible, offering various thesis topics on their automatic analysis. One topic could focus on analyzing road networks to aid city management. Another could investigate SR techniques to achieve sub-pixel accuracy in object detection and recognition.

More thesis proposals and info on QR-code:



Our courses

01DIZO: Digitální zpracování obrazu Tento kurz klade důraz na základní techniky zpracování obrazu, jako je redukce šumu a odstranění rozmazání, identifikace hran, registrace obrazu nebo Fourierova, Radonova a Houghova transformace. [1.roč.mag. LS 2+2]

01SFTO: Speciální funkce a transformace ve zpracování obrazu Hlavní pozornost je zaměřena na obrazové momenty a waveletovou transformaci a jejich využití v rozpoznávání objektů, detekci hran, odstranění šumu, registraci a kompresi obrazu. [2.roč.mag. LS 2+2]

01SU1/01USU: Úvod do strojového učení Úvodní kurz do strojového učení, který představuje rozhodování jako optimalizační problém. Objasní použití různých klasifikátorů, včetně perceptronu, k-NN, bayesovskou teorii, shlukování, SVM, LDA nebo PCA. [3.roč.bak. ZS 2+2]

01SU2: Strojové učení 2 Navazující kurz se zaměřuje na hluboké učení a zahrnuje teoretické i praktické aspekty síťových architektur. Témata zahrnují neuronové sítě, optimalizaci, CNN, generativní modely, RNN a pokročilé techniky, jako jsou transformery. [2.roč.mag. ZS 2+2]

Recognition of meteors in the sky



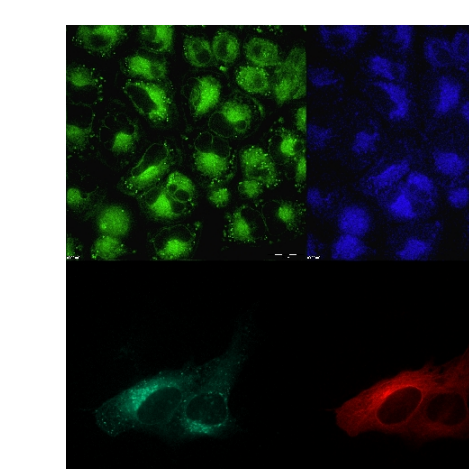
At an astronomical observatory, there is a device for meteor search. It periodically interrupts the scanning and the meteor trail is then dashed line. Unfortunately, blinking navigation lights of airplanes sometimes create similar pattern. Problems can be caused also by other objects on the snaps: satellites, clouds, etc.

Object recognition in historical maps



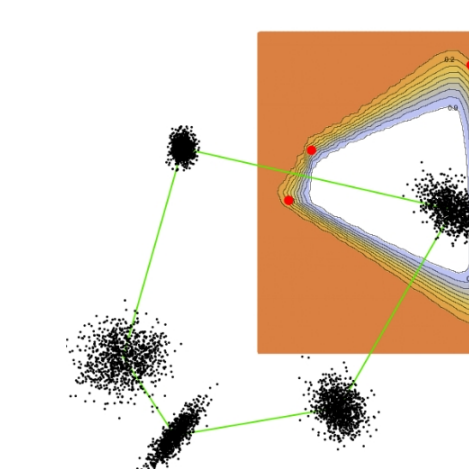
Historical maps depict essential landmarks, such as river networks or dwellings, in a much more artistic fashion and with less precision than their contemporary counterparts. Studying such maps is of great interest to cartographers because of their style, accuracy, and level of detail.

Multimodal data fusion for visualization



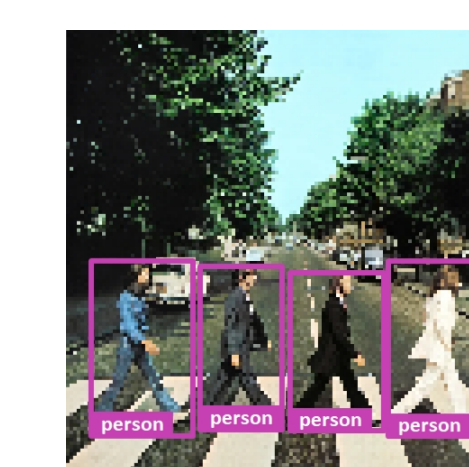
This study will introduce a novel approach to visualizing applied substances within cells by leveraging the power of multimodal data fusion techniques. The research aims to achieve a comprehensive and high-resolution visualization of cellular components by integrating data from various imaging modalities.

Probabilistic spatial fuzzy representation



Fuzzy set theory can be applied to spatial objects with random boundaries, enabling probabilistic definition of set operations. Therefore, the results from fuzzy algorithms are statistically valid, facilitating their use in diverse applications such as land cover classification, cadastral mapping or radar interferometry.

Finding the limits of detection algorithms



Nowadays, detection algorithms based on neural networks work with high detection accuracy. They are trained on objects with sufficient resolution, which may hinder their use in public spaces due to GDPR. Thus, we will explore the limits of detection algorithms at very low resolutions that could solve these problems.