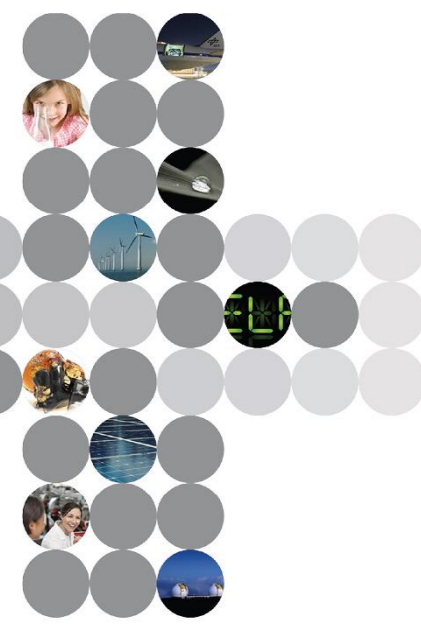


Data Generation for Deep Learning

Mario Russi, Brice Platerrier, Matthias Höchemer, Philipp A. E. Schmid
CSEM SA, Switzerland



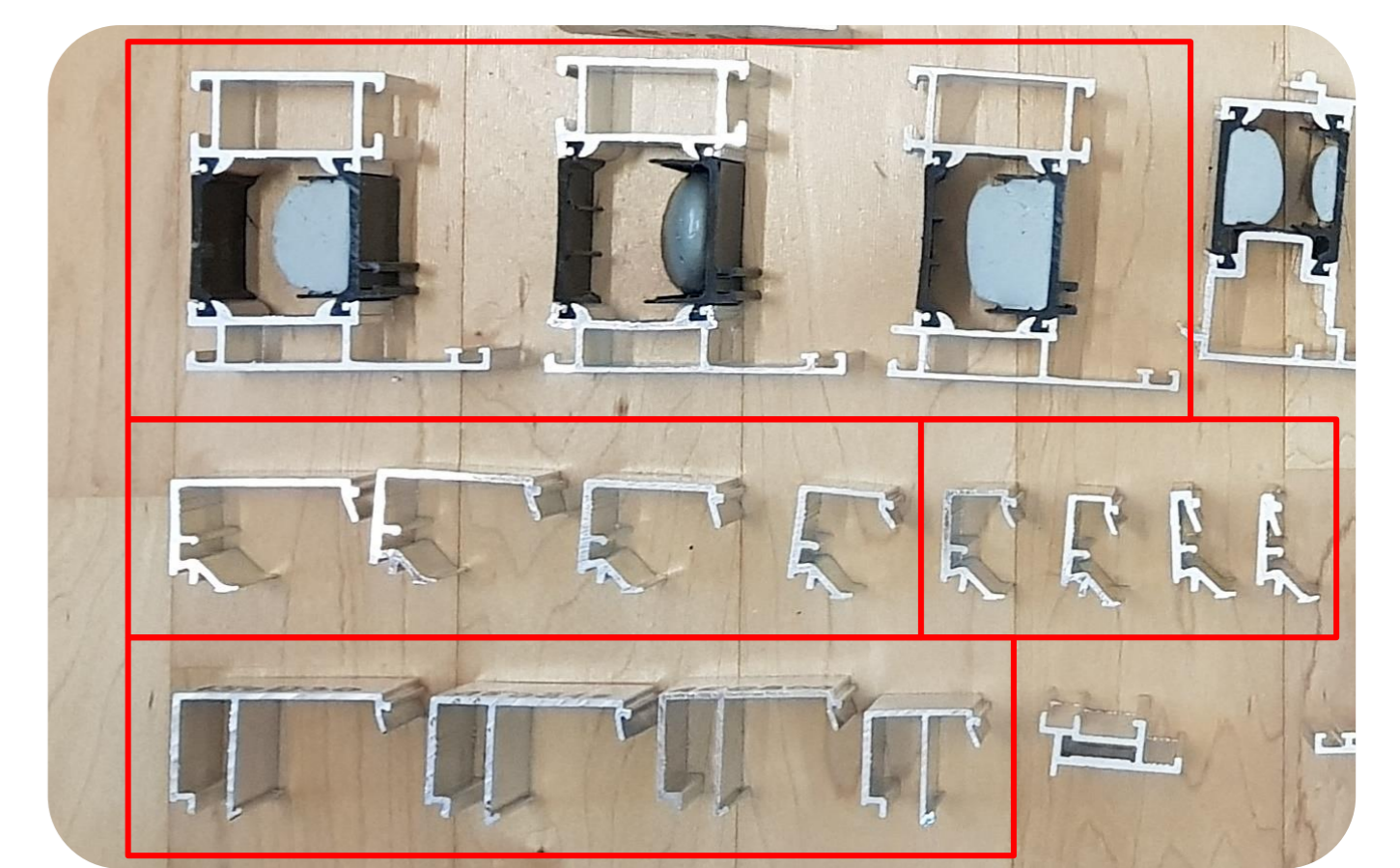
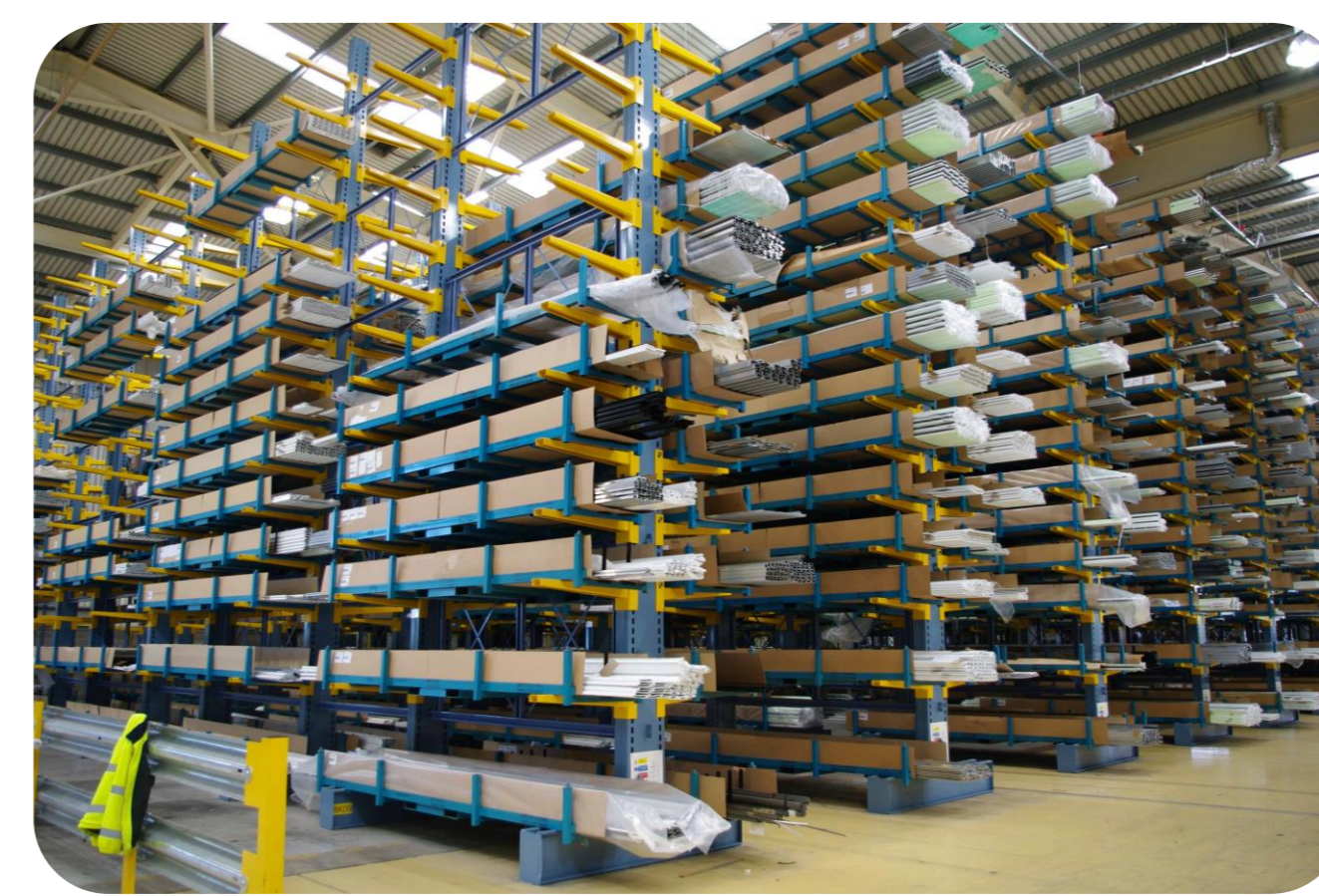
Deep Learning technologies have gained an increased interest for industrial applications. More often than not, having representative data is key for a successful project. However, data acquisition is often expensive or even impossible. In this specific case, the application for a fast and robust aluminum profile identification was only made possible by massively render and generate artificial data, since data acquisition was tedious: not all of the possible profiles are on stock, and colors change daily without fixed pattern. In order to increase the amount of data, data generation methods such as photorealistic rendering and artificial profile generation were used to increase the performance and robustness of the deep learning network. In total one million profiles were generated. Evaluated with a real database of 6'361 profiles, the top1 score of 98.2% and top3 score of 99.9% was reached.

Smart profile identification



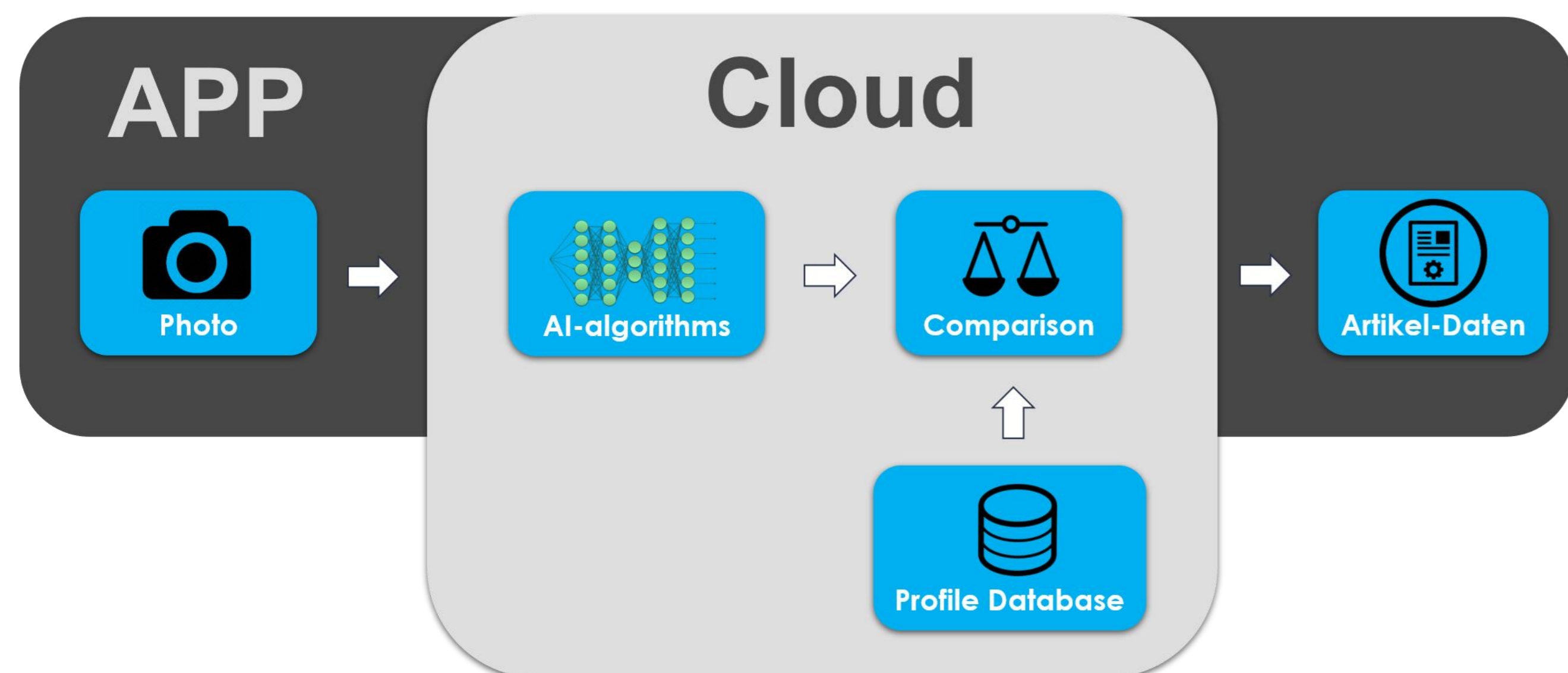
Powder coating facilities for aluminum profiles

- Various industries: aerospace, furnitures, window frames, ...
- Worldwide customers



Several thousand profiles in stock

- Big variation with all different colors
- Very small differences between profiles possible



User friendly application

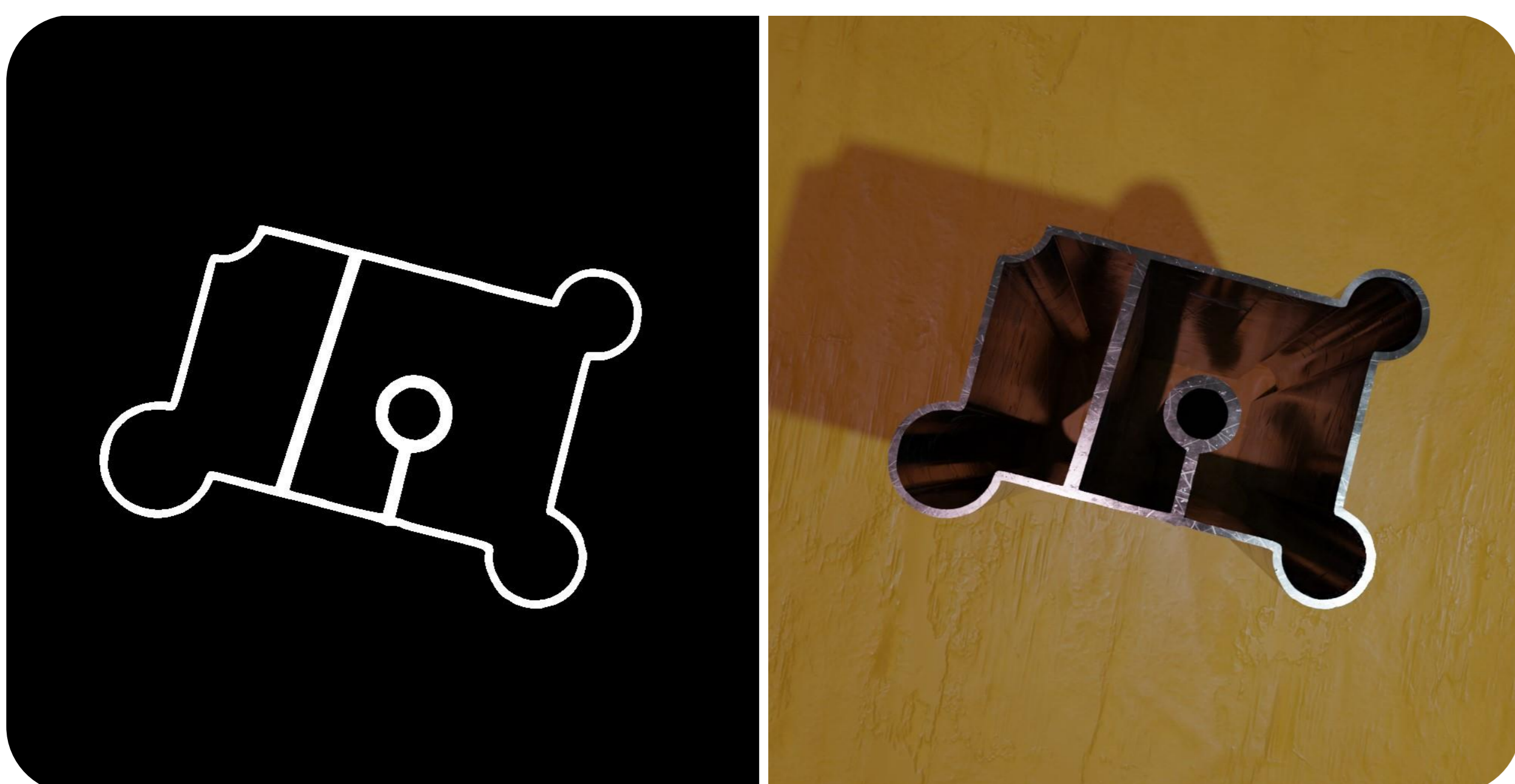
- Identification of profile via smartphone within seconds
- Deep Learning application & database hosted on Cloud



Deep Learning

- Data is key and major contributor to project's success
- However, data acquisition usually highly costly
- 10% Deep Learning, 10% Processing Power, 80% Data

Photorealistic rendering



- Render photorealistic images within seconds
- Create dataset with high variation
- Train neural network with mix of real with rendered data

Artificial defect generation



- Often: much data for correct part, sparse data for faulty parts
- Solution: use neural network to create artificial, but realistic defects on correct parts