Improving A.I. Development Workflow

POPULAR SCIENCE SUMMARY **Jonas Alfredsson, Anton Friberg**

During development of machine learning algorithms, a massive amount of data and compute power is needed. Taking ideas from industry leading companies we propose a new workflow, with new software tools, to optimize the development process.

Most people have probably heard that computers and machines are slowly replacing humans in many of the lower complexity jobs, since they are more consistent and reliable. However, one area where humans still remain superior to computers is when it is necessary to identify objects in pictures and video. While it may seem trivial for humans, it is actually very difficult for a computer to identify, for example, a cat in a picture. Extremely complex hardware and software is needed to be able to produce algorithms which are just barely comparable to a human in this single task. Researchers are making enormous improvements every day, but there is still a long way to go before it will become as accurate and versatile as a human.

The field of research is called "computer vision", and it has seen a great increase in popularity due to the need for this technology in self-driving cars, as well as recent advances in machine learning algorithms. However, while our thesis work was performed at a company developing video surveillance solutions, very similar identification algorithms are being used in this industry as well. For this industry it would be very valuable to, for instance, be able to identify individuals from a video feed, and then be able to track that person as they move between different cameras inside a building. This would make it much easier to track down illegal activity, or find missing persons, since a computer would work faster than a human.

One of the most significant problems developers face today, when creating these algorithms and teaching them how to identify persons, is that the process requires a huge amount of data and computing power. As such, it is common for companies to quickly notice that their established methods of storing data, and handling compute resources, are too inefficient to handle this workload. Solving these inefficiencies are crucial to making sure companies remain competitive in this new market.

Together with employees of the surveillance company we identified some large bottlenecks in the development process, and started looking at what other industry leading companies did to counteract these. We gathered information on the best methods and practices for storing and sharing data, and identified how code and compute resources are best shared between developers. These practices were studied and combined into a workflow, to be used in the company's department, in order to increase efficiency of visual image processing under various machine learning and other data science experiments.

The intention with this work has been to provide general guidelines and propose a solution that can be applied in other companies that face the same problems.