Hessisches Kompetenzzentrum
für Hochleistungsrechnen

Detecting Suitcase Damages With Artificial Intelligence – IT-Project Lufthansa



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Project Term
2023 - 2023

Clusters
Lichtenberg II Cluster Darmstadt

Software
Python, TensorFlow

Additional Software
LabelImg

Institute
Department of Computer Science

University
Technische Universität Darmstadt

Partners
Lufthansa Group

Introduction

Artificial intelligence is currently developing faster than ever and introduces many different possibilities. Our client Lufthansa wanted to make use of these possibilities in order to make customer service faster and cheaper. The project “IT-Project Lufthansa” was a university-internal project in cooperation with the Lufthansa AG. The goal of the project was to develop an artificial intelligence that can identify and classify damages on luggage. Furthermore, a user interface was created for customers and employees from Lufthansa.

Methods

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN
TECHNISCHE UNIVERSITÄT DARMSTADT
UNIKASSEL VERSITÄT
Philipps Universität Marburg

Our team used Jira Agile for the organization of our workflow and the requirements given by our client. For developing the AI, we used the TensorFlow library and the programming language Python.
The most important part of creating an AI that can detect suitcase damages, was gathering and labeling pictures of damaged and non-damaged suitcases. We gathered the pictures via Google, Instagram, Facebook and by taking pictures by ourselves. For the labeling of the images, we used the software LabelImg and created different guidelines for the labeling of the images by our labeling specialists. After labeling the gathered data, we augmented it and trained our model with it.
Because the team only had one GPU available which did not have sufficient memory and computing power to train a model to identify damages with a high accuracy, the power of the HPC was needed. With the access to the Lichtenberg Cluster, we could drastically improve the accuracy of our model and additionally train it faster.
Besides creating the AI, the team also developed a user interface to show how the models could work in everyday activities.

Results

With the possibility of training with better models, our AI soon was able to detect suitcase damages with an accuracy of 50% and suitcases in general with an accuracy of almost 100%. Furthermore, it can classify the damages into tear, hole, dent, scratch and stain.

Discussion

Considering that none of the team members had experiences with the creation of an AI and the little time we were given, we were able to create an AI from scratch that, in the future, might preserve Lufthansa from fraud cases regarding damaged suitcases. Although our contacts at Lufthansa AG told us that they likely will not use our product but rather use it to show the management what is possible with AI in a short period of time. Theoretically the product could be used in the future when every airport is equipped with cameras to take pictures of the luggage before the flight, so that the occurring frauds within the complaints could be prevented.
Furthermore, it could make customer service processes faster and facilitate the work of Lufthansa employees. Indeed, it can still be improved by more data and more training, but above all we were able to show the possibilities of AI. Overall, the partner of the project, Lufthansa AG, was also very content with the achieved accuracy of our models.

Figures



Figure 1: Damage detection boxes on a damaged bag.



Figure 2: Softshell detection box on a damaged softshell bag.

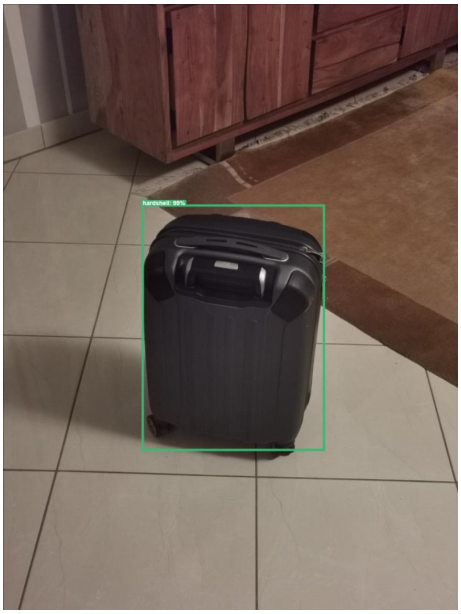


Figure 3: Baggage detection boxes on a non-damaged hardshell bag.

Last Update: 2023-08-15 14:27