CIRI

Classification of incident-related image using machine learning

Data science course

A.Y. 2023/2024, GROUP 53

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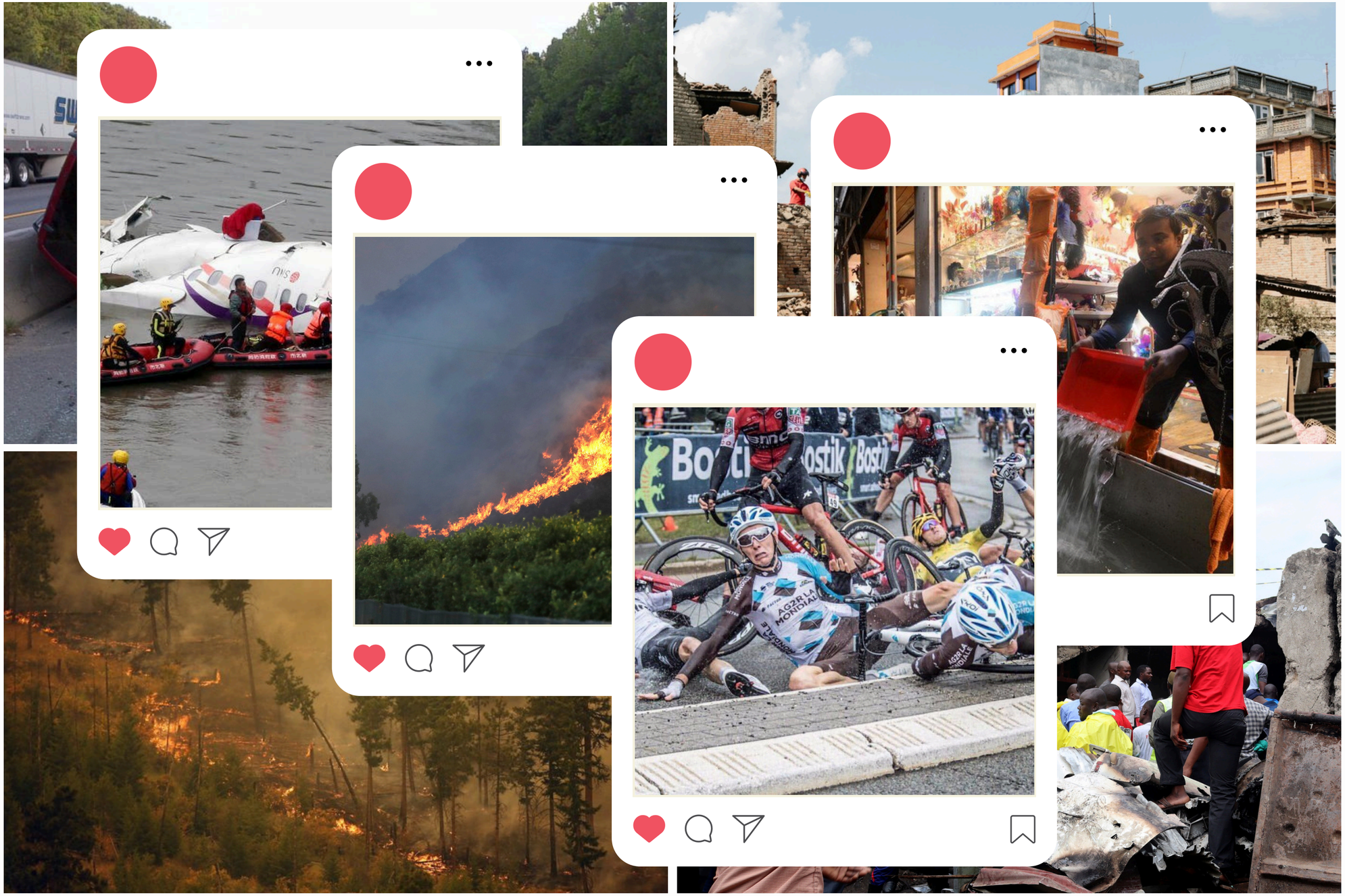
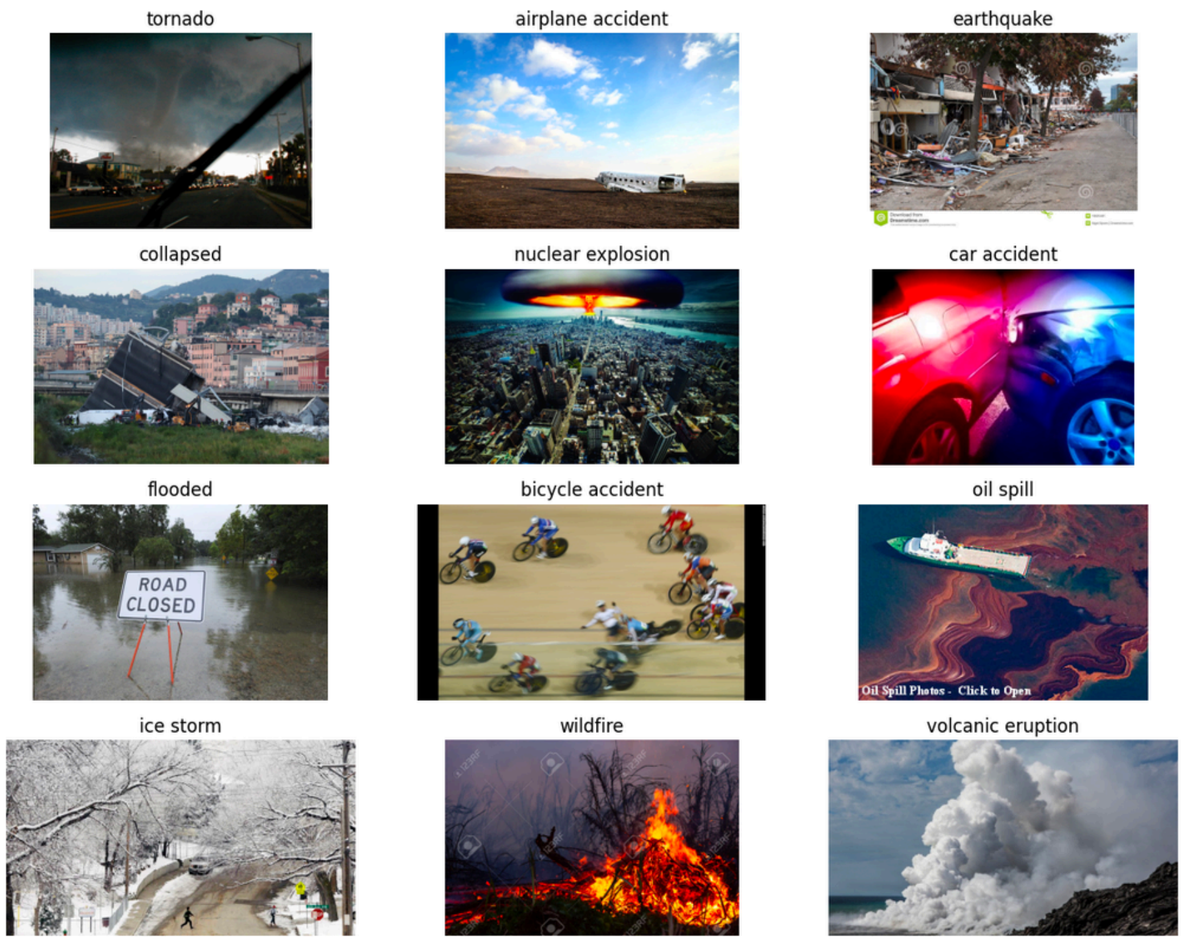
Giulia Pais

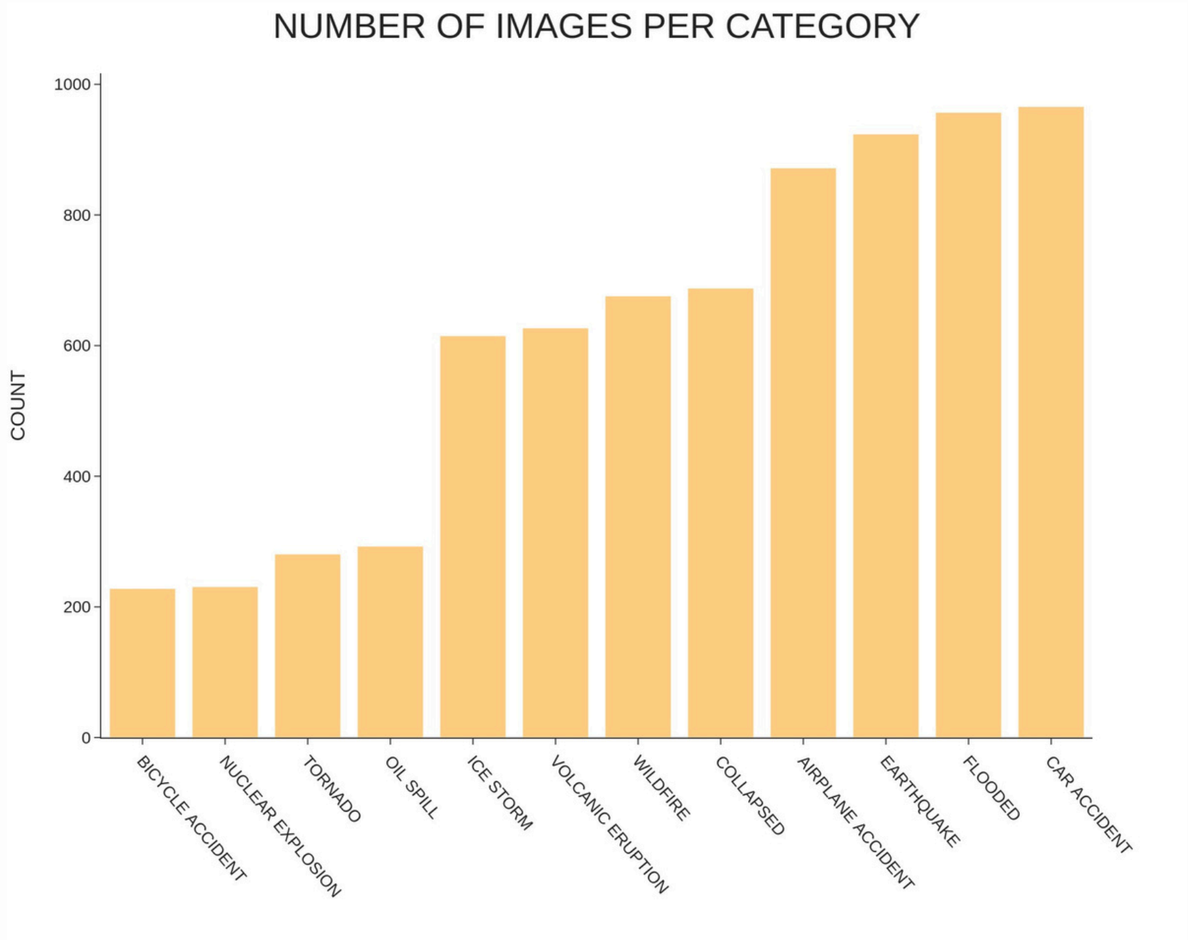
UNIVERSITY OF TWENTE.


SWIFT
POLICE



THE DATASET





E. Weber, et al.,"Incidents1M: A Large-Scale Dataset of Images With Natural Disasters, Damage, and Incidents" in IEEE Transactions on Pattern Analysis & Machine Intelligence, vol. 45, no. 04, pp. 4768-4781, 2023.
doi: 10.1109/TPAMI.2022.3191996

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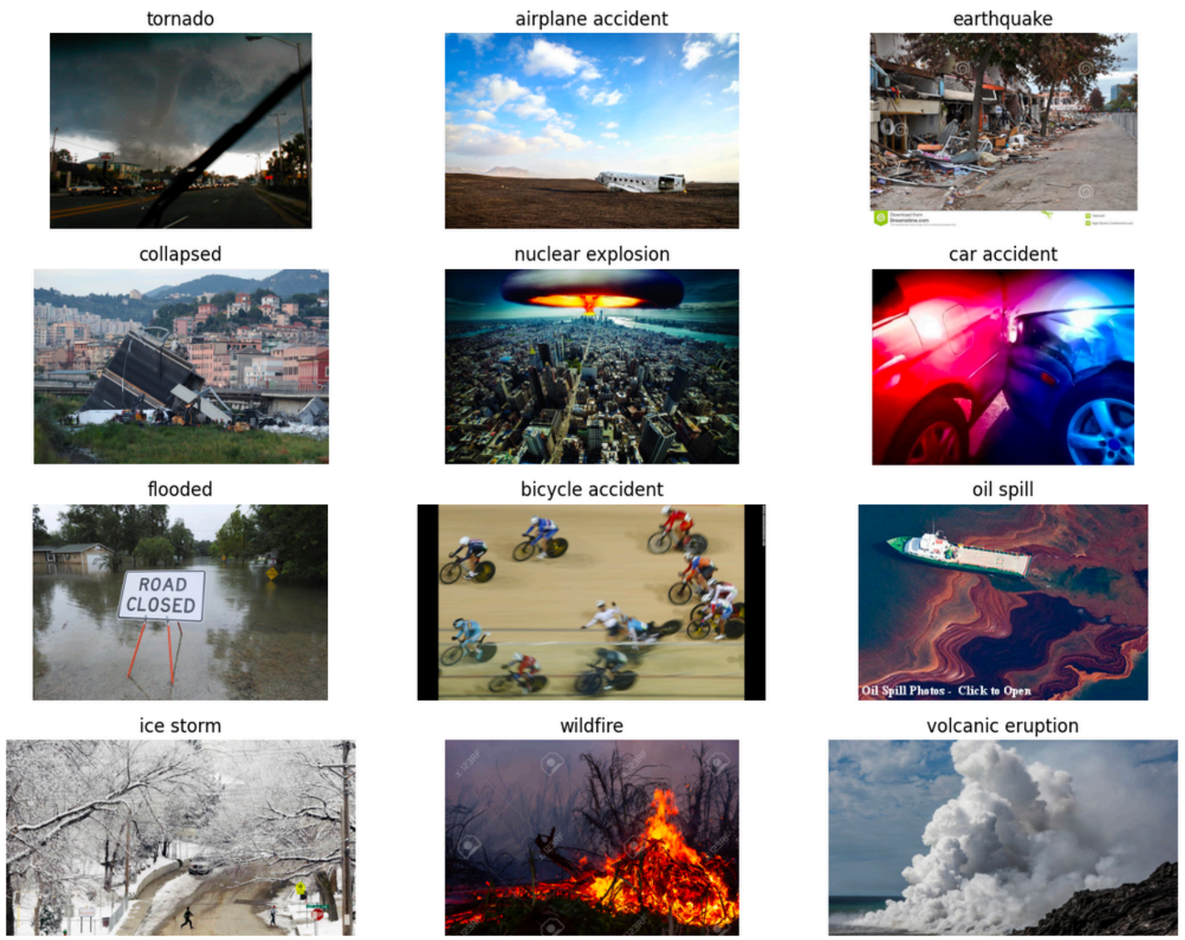

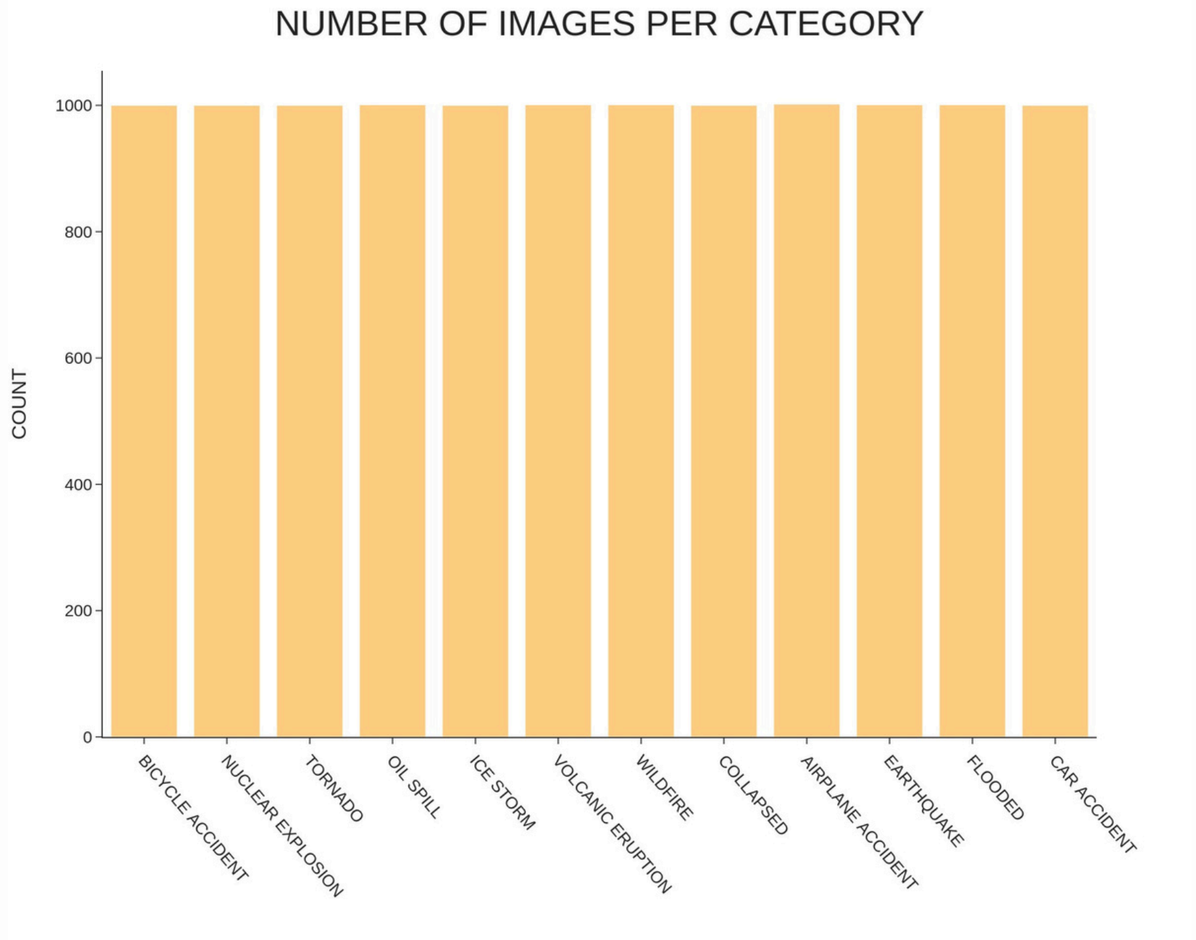

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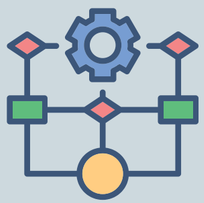
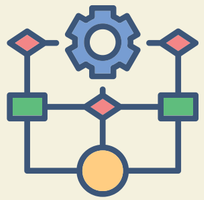
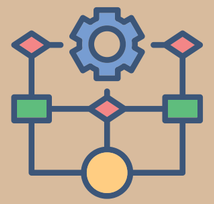
MODELS AND LIMITATIONS



ResNet50



Wide ResNet 50



Vision Transformers

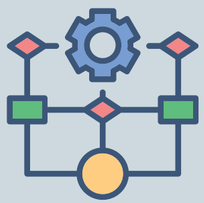
Limited access to resources

Training models is expensive, requires access to powerful GPUs

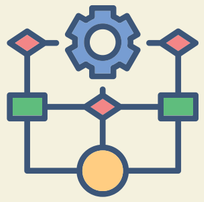
Deadlines

Training is time consuming

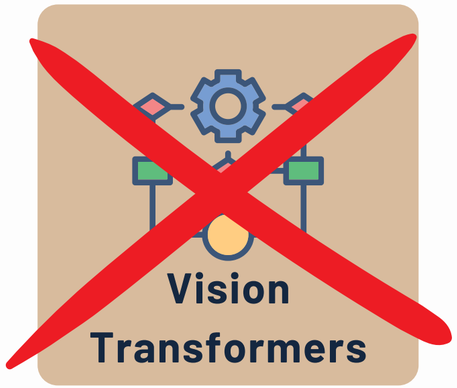
MODELS AND LIMITATIONS



ResNet50



Wide ResNet 50



Vision Transformers

Limited access to resources

Training models is expensive, requires access to powerful GPUs

Deadlines

Training is time consuming

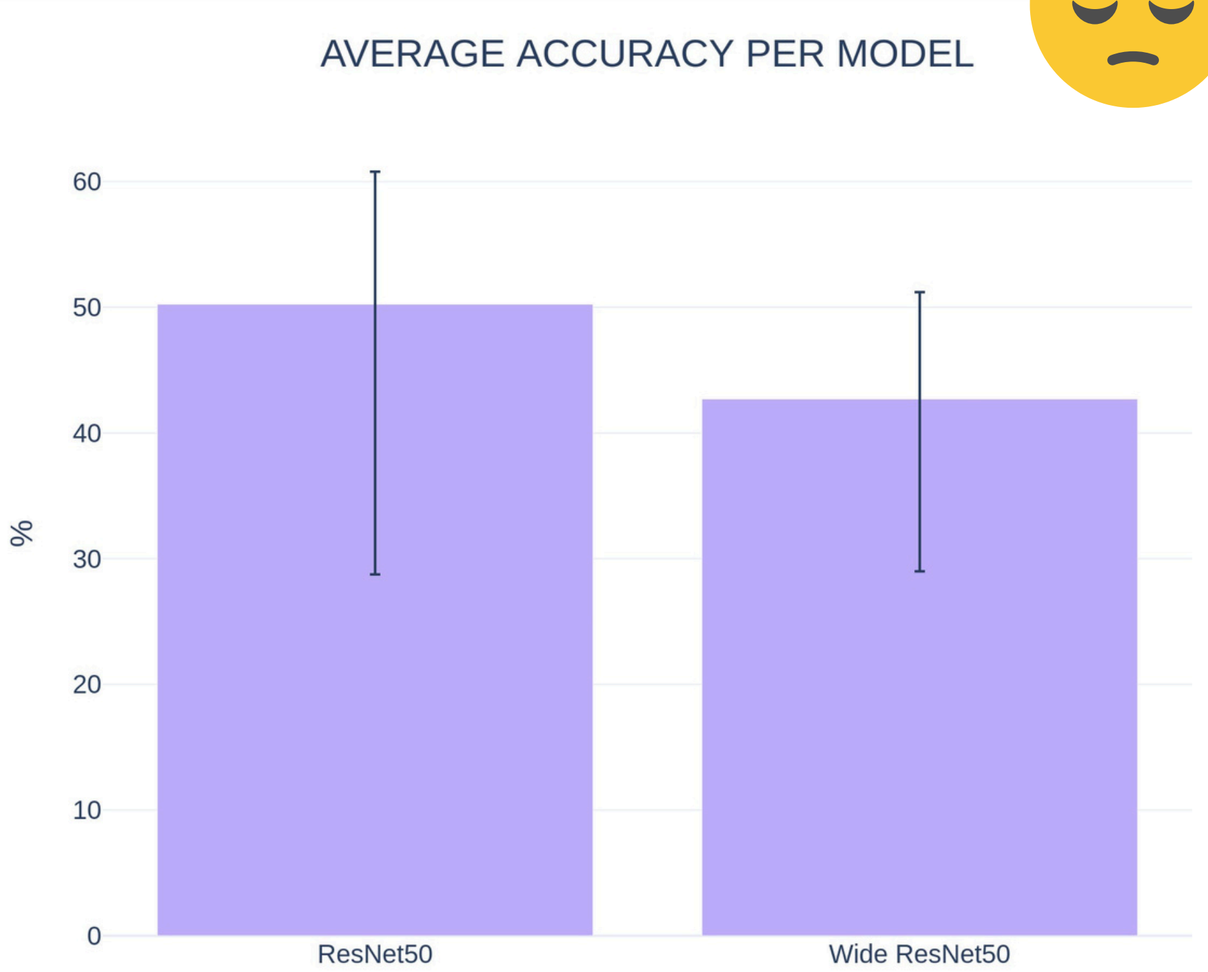
Results

Evaluate through accuracy

The amount of times the model predicted correctly over all predictions

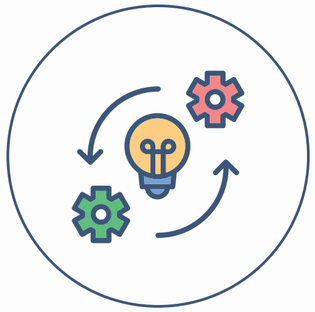
How reliable are the results?

Cross-validation is like a practice test for our model before the big exam. We split our data into several small tests to make sure it can handle different types of questions and isn't just memorizing the answers



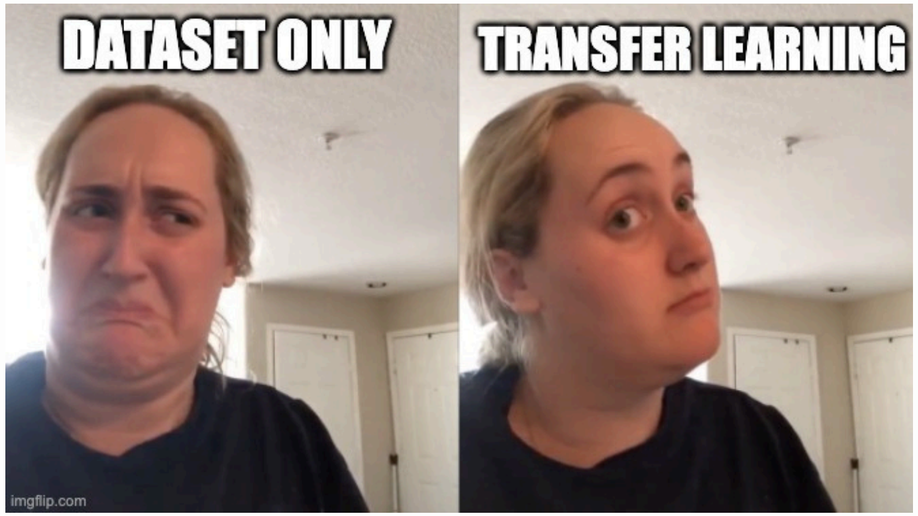
Mean accuracy comparison between ResNet50 and Wide ResNet50, after 5-fold cross-validation

...so we tried something else



Transfer Learning

Transfer learning is using what a model has already learned from one task to help it perform a new, related task, saving time and effort.



Mean accuracy comparison between ResNet50 and Wide ResNet50, without transfer learning (grey) and with transfer learning (green)

POSSIBLE EXTENSIONS AND IMPROVEMENTS

Vision Transformers

Vision transformers offer an alternative approach to traditional computer vision models based on CNNs

Ensemble Learning

Combination of two or more models to reduce impact of outliers and improve performance

Fine Tuning

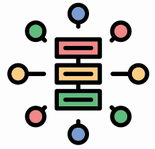
Operate fine tuning in transfer learning and see if we can improve accuracy even further

Extending the Dataset

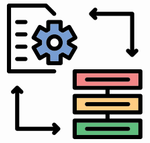
More images, other kinds of data like text and sound

TO RECAP...

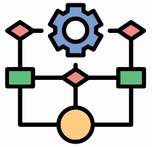
Subset of Incidents dataset



Data augmentation



Model selection



Training and evaluation

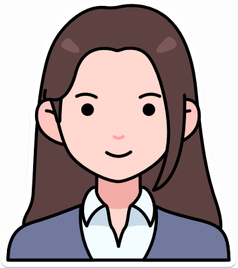
Transfer learning

Possible extensions and improvements

Incident Detection

The team

Caitlin Wong



Giulia Pais

Thank you for your attention!

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