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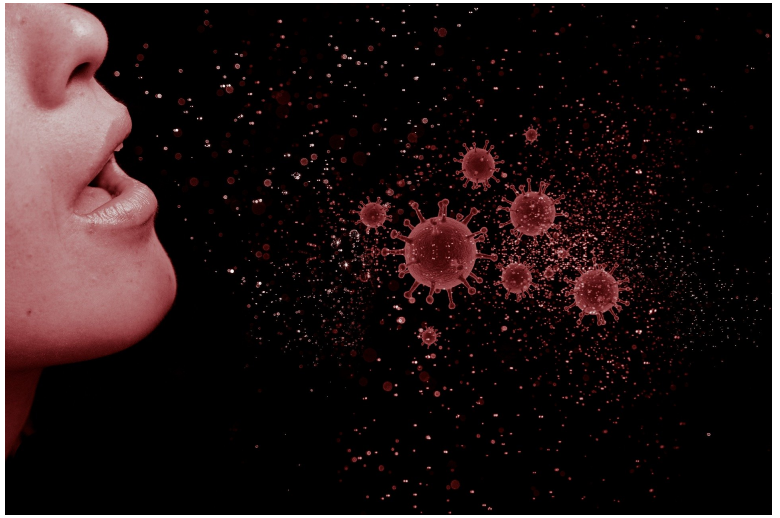
Face Mask Recognition

- COVID-19 has turned to the world's number one challenge.
- Wearing face masks are an effective way to prevent COVID-19

https://pixabay.com

Goal: to build a tool to recognize people who are not wearing a mask using machine learning and deep transfer algorithms.



Novelty:

- To design computationally efficient algorithm by using novel approaches (e.g. Using mask location as an input layer for NN)
- Improve performance by using datasets diverse in face coverings,..

Dataset

- Total face (2925), mask(47%), no mask(53%)
- Image annotation (label, face location, mask location)

https://www.kaggle.com/alexandralorenzo/maskdetection

https://www.kaggle.com/wobotintelligence/face-mask-detection-dataset

https://kaggle.com/andrewmvd/face-mask-detection

https://kaggle.com/alexandralorenzo/yolov3-startkit

Pre-processing

Identify and crop faces

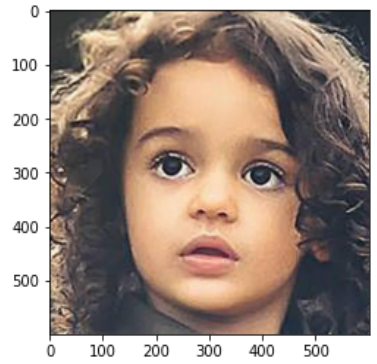
Resize cropped faces

Generate flattened feature vectors

Model development

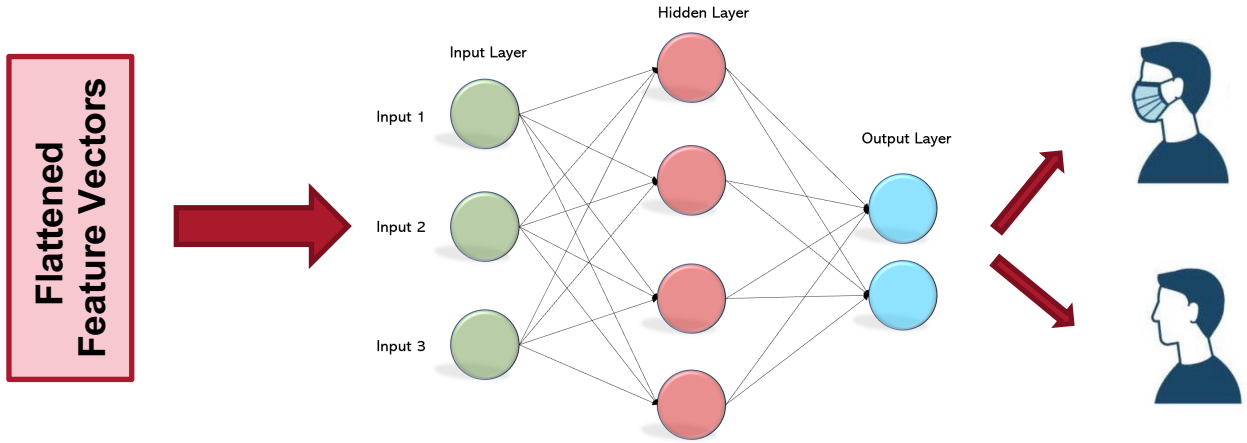
Logistic regression vs. Multi-Layer Perceptron (MLP)

Logistic regression



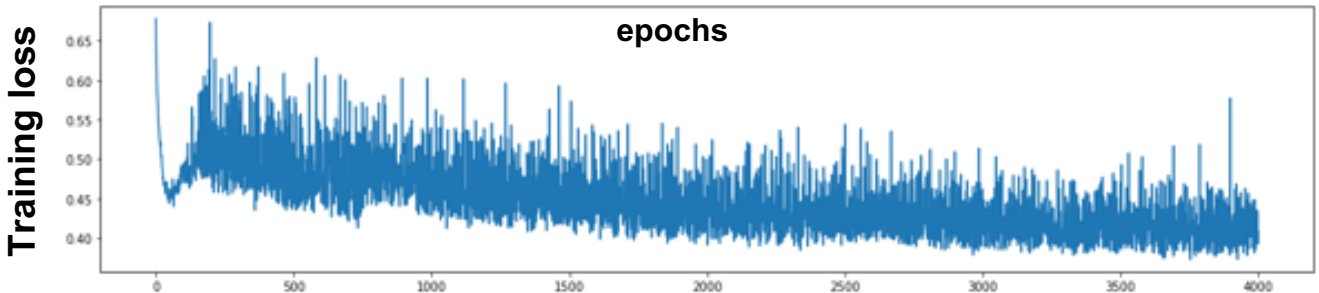
	Mask	No
precision	0.55	0.64
recall	0.88	0.23
F1-score	0.68	0.34

MLP



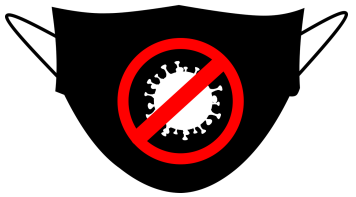
	Mask	No
precision	0.87	0.67
recall	0.54	0.92
F1-score	0.66	**0.78**

- MLP with optimized architecture performs better than logistic regression

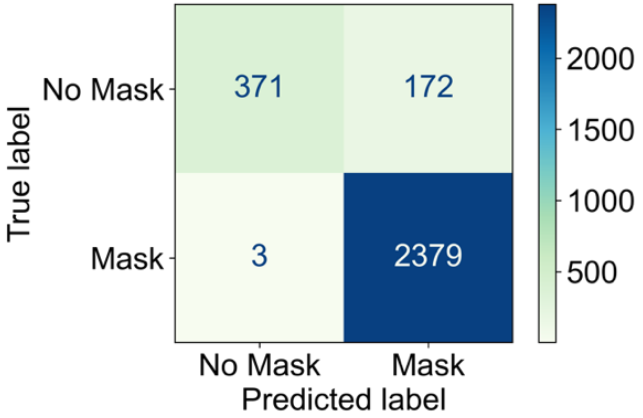


Yolo dataset

Deep Convolutional Neural Network (Transfer learning using DenseNet121)

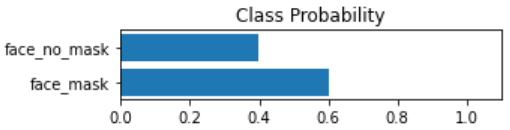


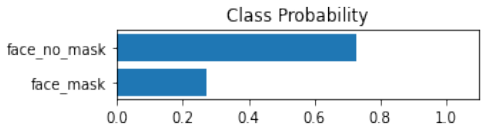
Performance on Test set



	No	Masked
precision	0.99	0.93
recall	0.68	0.99
F1-score	0.81	0.96

- Some experiments with images not in the training set





On going work

- Improve the computational efficiency of the model to be used with surveillance cameras to detect people who are not wearing face masks
- Improve the diversity of the dataset to improve performance