Children safety and privacy protection through facial characteristics censorship in photos

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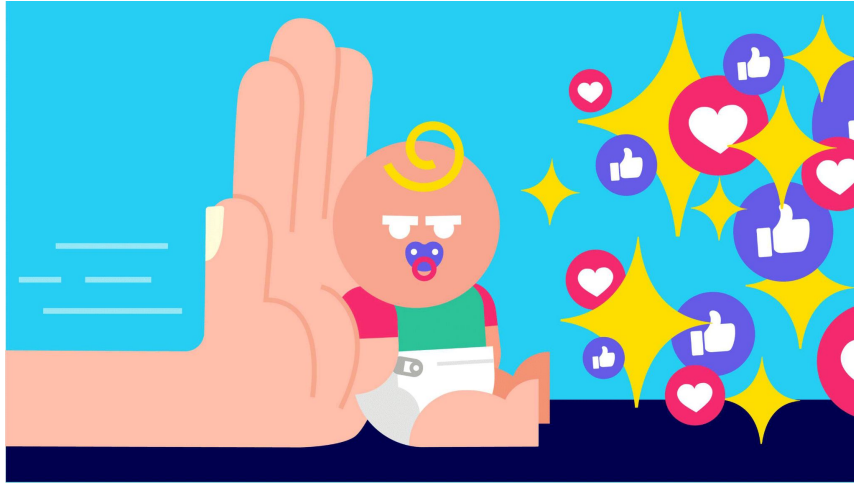# 1. Introduction

What   Why   How

Social media revolution (2010 -)

◎ Access from everywhere
◎ Write whatever you want
◎ Share whatever you want
◎ Meet new people
◎ Chat with friends
◎ New services are offered all the time

Privacy concerns

Family with young children online privacy & dangers

Family with young children online privacy & dangers

Photo censorship

2.

Dataset

Data collection

Data Description and Sources

Sources to create custom dataset:

◎ Gathered images from search engines
◎ Added personal photographs

Type of images:

◎ Random infants photographs found online
◎ Photographs of families with children

Examples of Photographs

Process of creating the dataset

3 datasets created (training, validation, testing)

Process:

1. Collect images
2. Extract faces from images as separate images
3. Manually classify the images of the extracted faces into two categories, placing each one in the respective directory (_babies_ and _not-babies_)

3.

Face Detection

Extracting faces from images

YOLOFace

◎ Deep learning based Face Detection in images

◎ Uses YOLOv3 real-time object detector

◎ Open-source software (MIT license, hosted on GitHub)

◎ Trained on "Wider Face" dataset:

Faces Extraction Example

YOLOFace

Other methods tried

- OpenCV Haar cascades
- OpenCV DNN Face Detector
- HOG + Linear SVM Face Detector
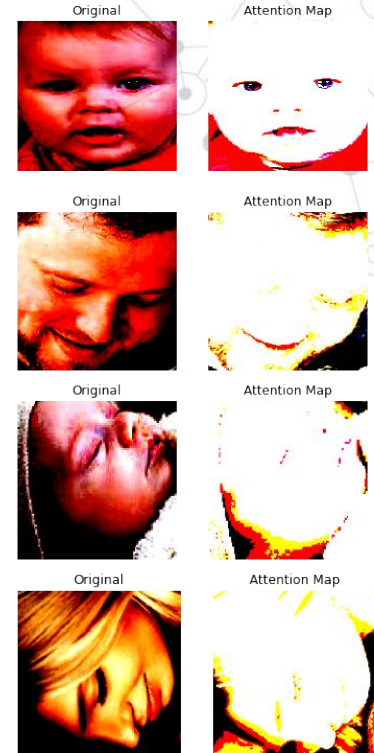- MMOD + CNN Face Detector
- MTCNN

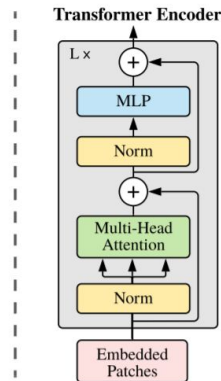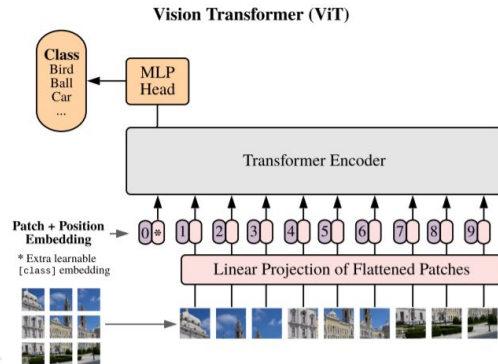**Did not work as well for us.**

4.

Classification Models

Get a good classifier with a few data?

Visual Transformers

◎ Based on Transformers from NLP

◎ Pre Trained on *imagenet21k*

◎ "Understands" context

◎ Does not assume locality of features

◎ Generalizes well even with small dataset

VGGFace2

◎ Task-specific pretrained model *ResNet-50*

◎ 3M images from 9000+ people from all over the world

◎ 2 uses

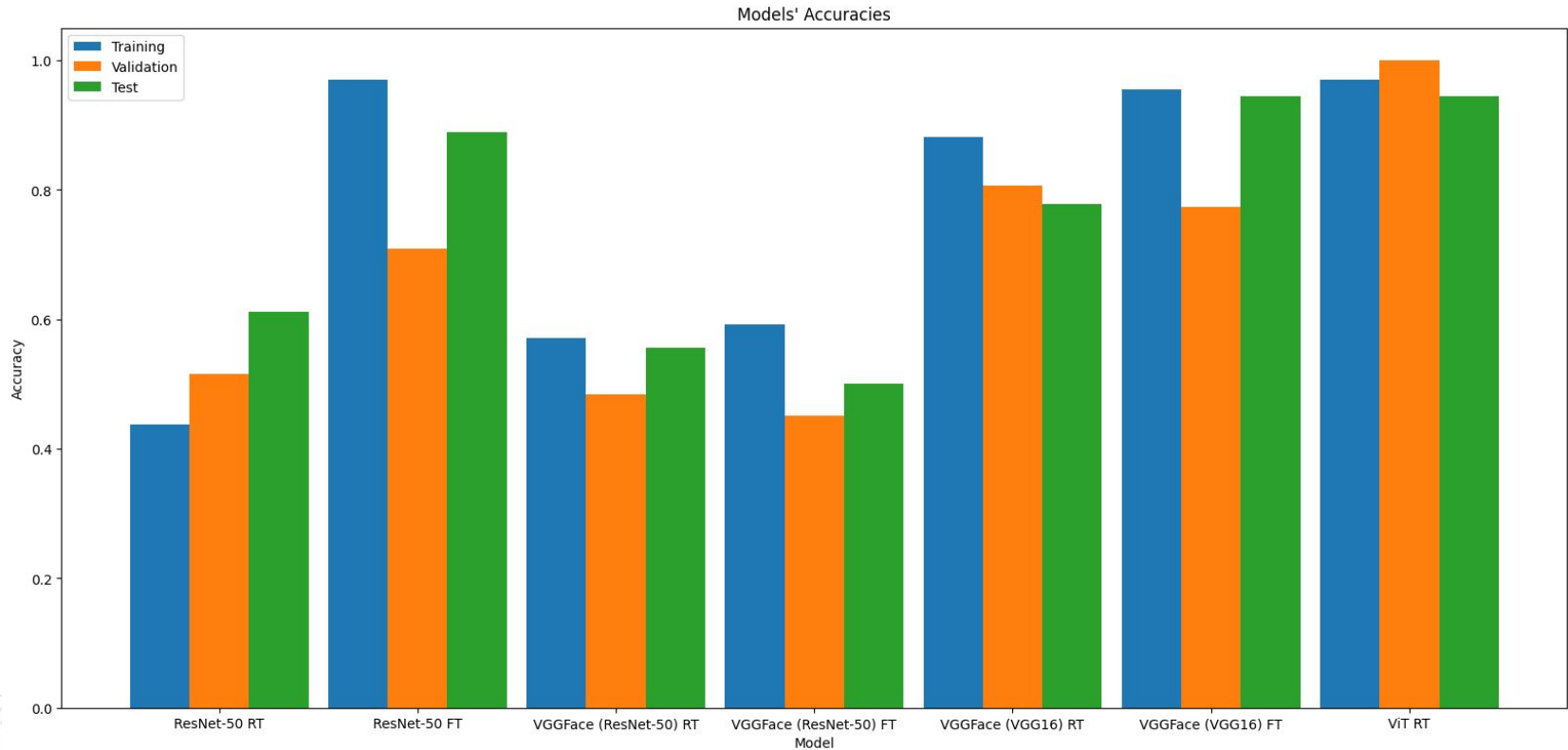- ○ Feature extraction and then classification
- ○ Fine tuning

5.

Results and Conclusions

Models results

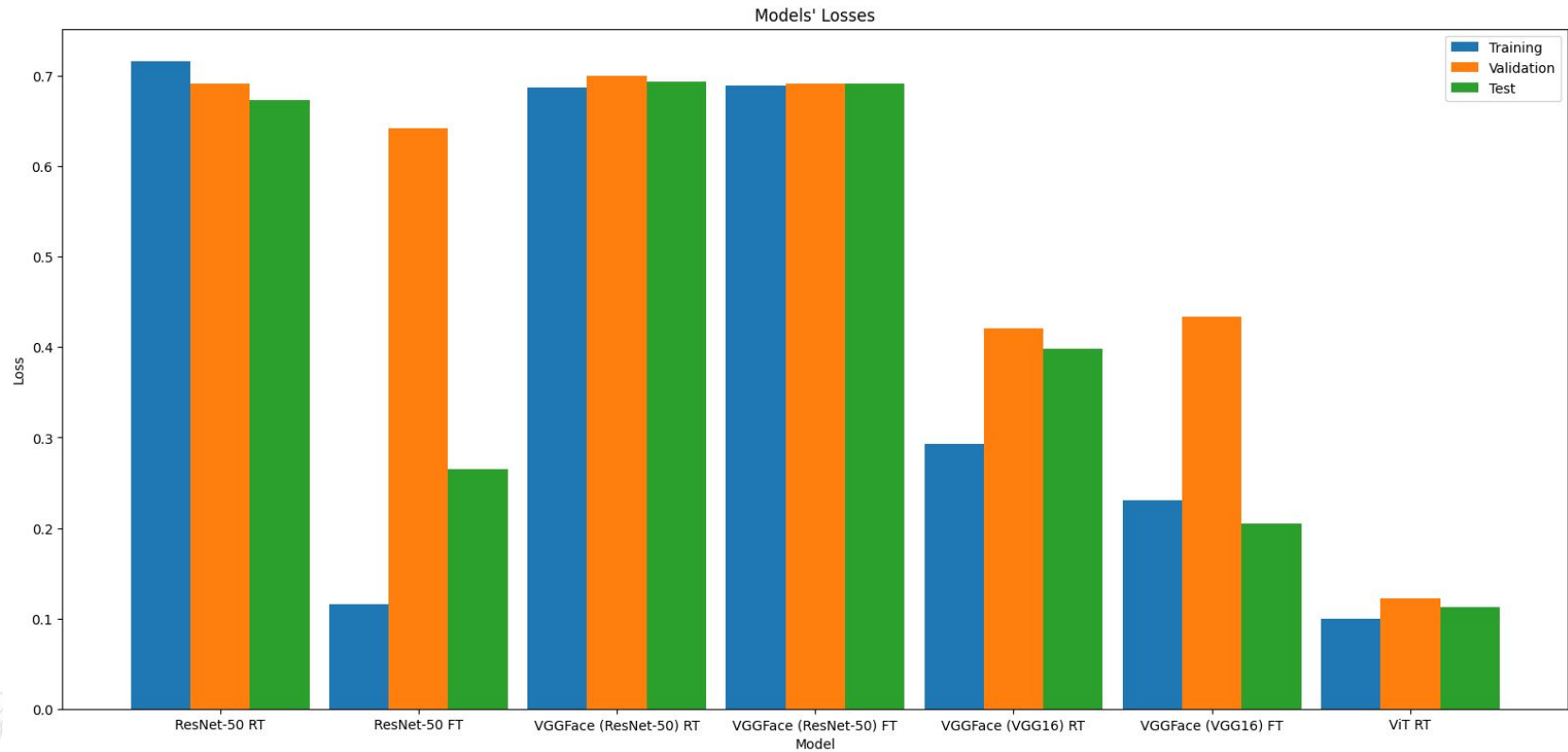Models' Accuracies

Models results

Models' Losses

Overall results

Successful result

Result with small
error

Further improvements

◎ More data is always welcome

◎ More diverse and adversarial examples in trainset (adults with baby faces or babies with aged faces)

◎ More complex data (pose, angle, age, scale, etc…)

◎ Improvement of Face detection model for more accurate bounding boxes

A little show off

Let's watch a demo video

Thanks!

Any questions?

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