Children safety and privacy protection through facial characteristics censorship in photos

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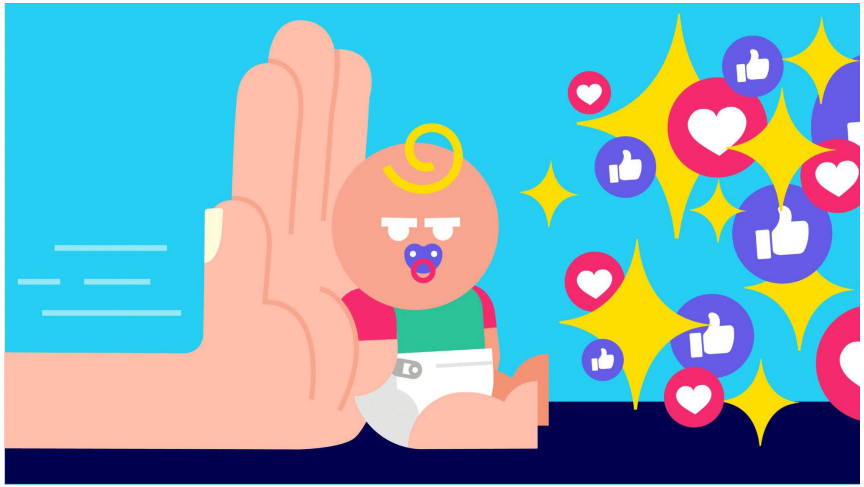
1. Introduction

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

Face Detection Module

Classification Network

Hide the Face Module

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.

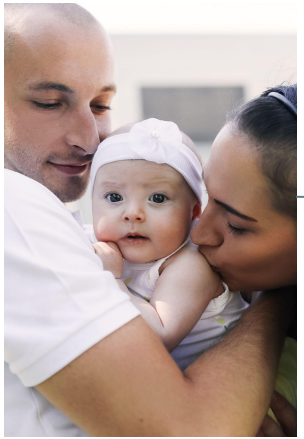
Face Detection

Extracting faces from images

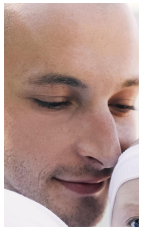
YOLOFace

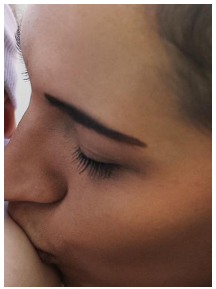
- Deep learning based Face Detection in images
- Uses YOLOv3 real-time object detector
- Open-source software (MIT license, hosted on GitHub)
- Trained on “Wider Face” dataset:

Faces Extraction Example



YOLOFace





Other methods tried

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

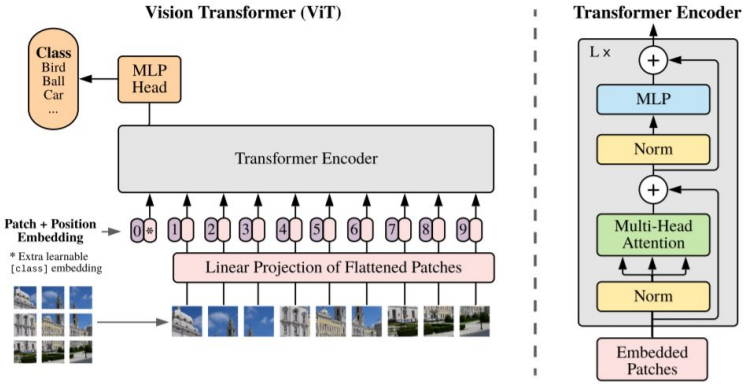
Did not work as well for us.

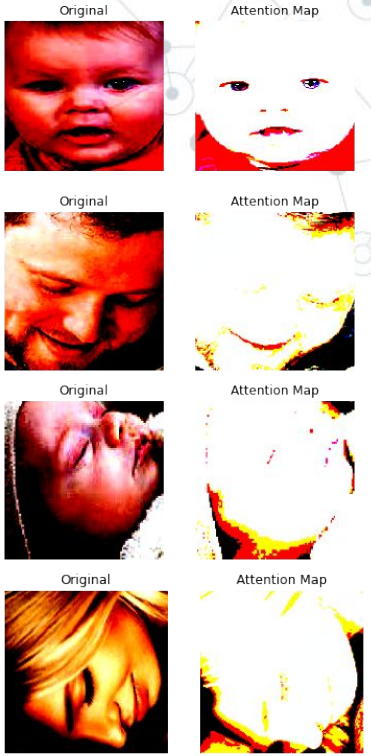
4.
Classification Models

Get a good classifier with a few data?

Vision Transformers

- Based on Transformers from NLP
- Pre Trained on *imagenet21k*
- “Understands” context
- Does not assume locality of features
- Generalizes well even with small dataset





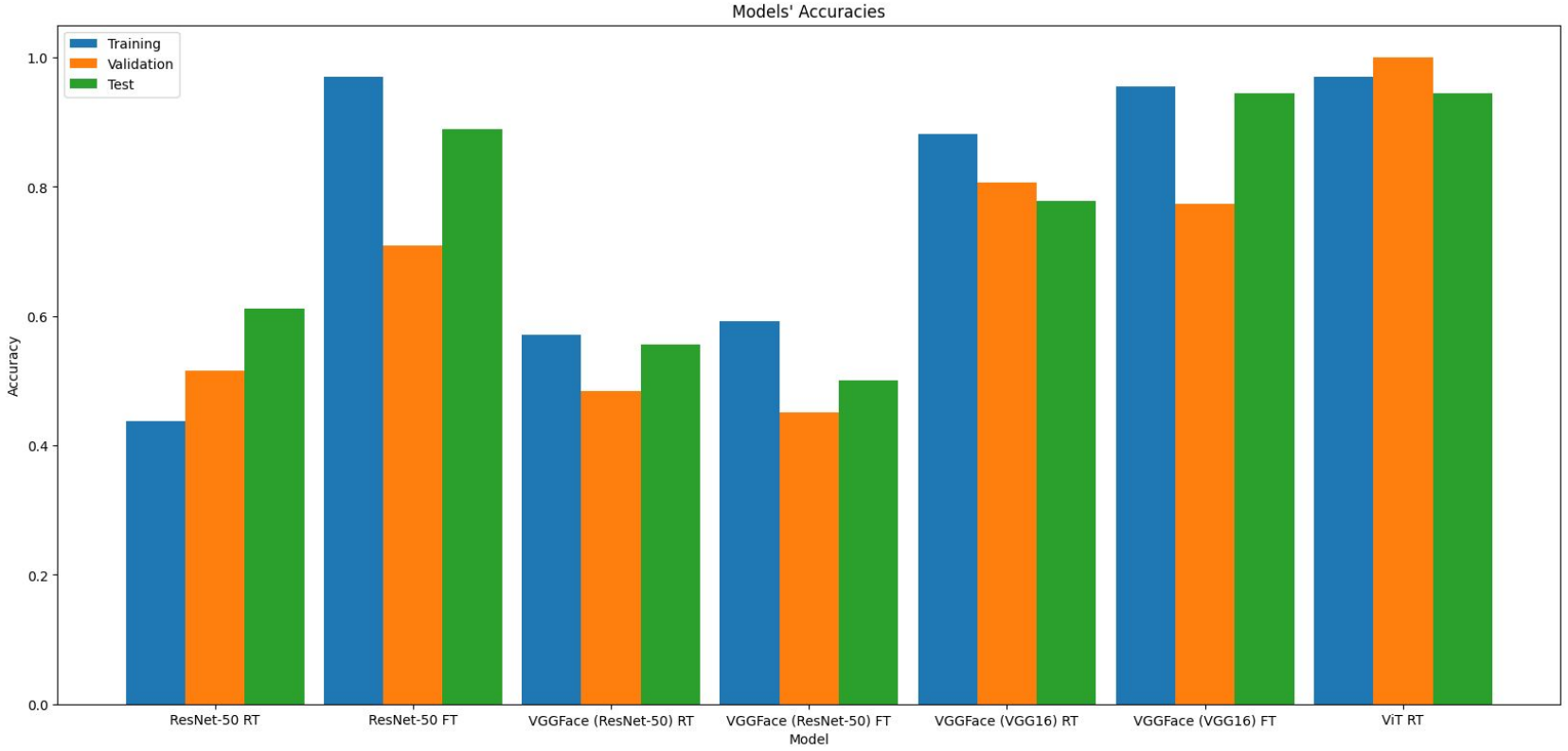
VGGFace2

- 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

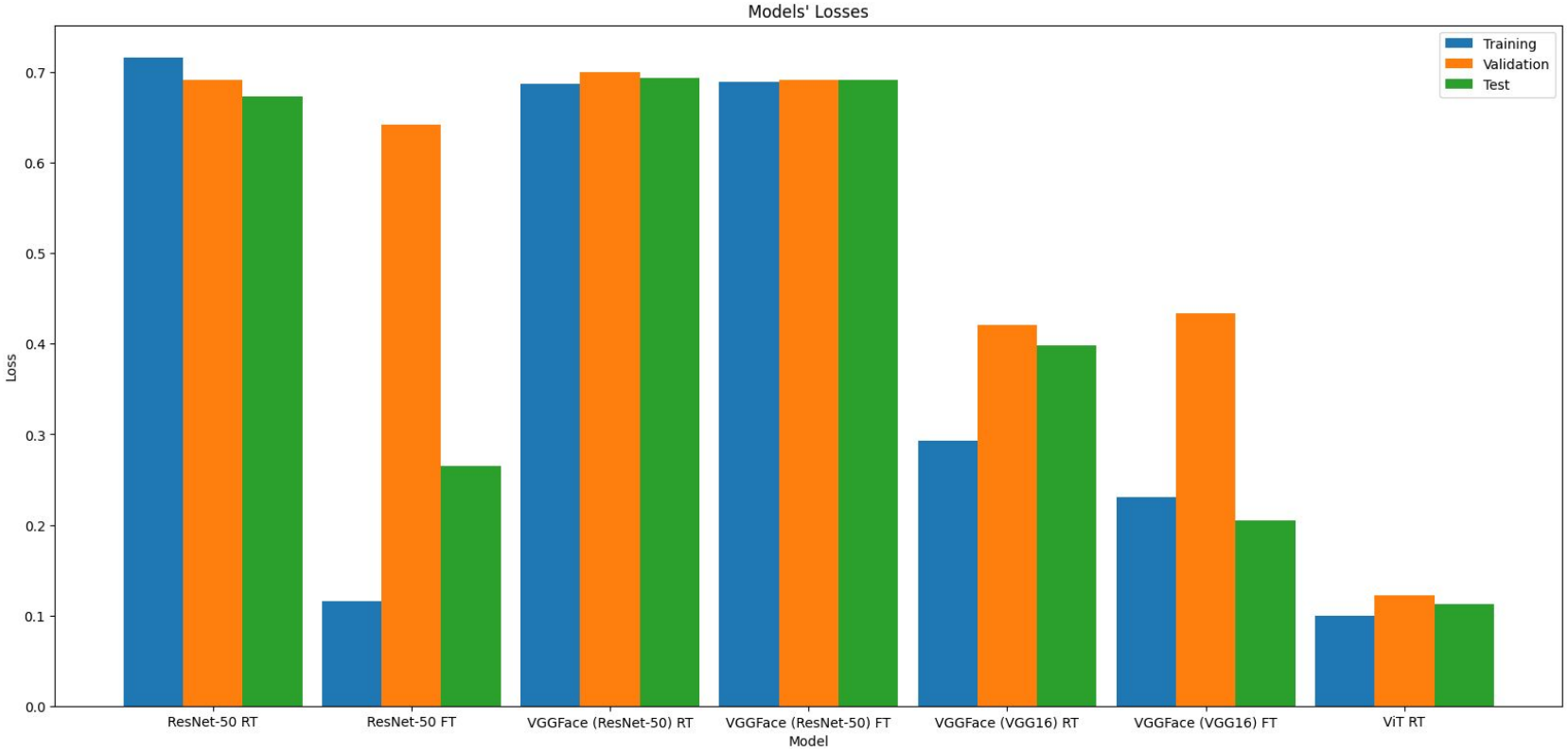
5.

Results and Conclusions

Models evaluation



Models evaluation



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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