

Kinship Verification & Detection :

FINDING FAMILIES IN THE
WILD !!

Introduction

- ❖ Human trafficking is an unfortunate problem we face on an international scale.
- ❖ Every parent's worst nightmare is too often the effect caused by such atrocious acts of kidnapping motivated by profit.
- ❖ Even discussing the topic is sickening; however, sitting back and ignoring it, like most problems, would likely only lead to things getting worse.
- ❖ Hence, the Department of Homeland Security (DHS) puts forth efforts to address the problem with incentives like their Blue Campaign.

So, what does this have to do with recognizing families?

- ❖ As you might imagine, authorities often find children being exploited online but **cannot identify the child in the video.**
- ❖ One method is via **the process of elimination**, where an investigator manually sifts through missing children. Considering there are nearly a **half-million missing children at any given time in the US alone** (globalmissingkids.org/awareness/missing-children-statistics/), the solution of manual inspection is impractical.

KVR???

- ❖ Kinship verification and recognition (KVR) is the machine's ability to identify the genetic and blood relationship and its degree between humans' facial images.
- ❖ The face is used because it is one of the most significant ways to recognize each other.
- ❖ Automatic KVR is an interesting area for investigation. It greatly affects real-world applications, such as searching for lost family members, forensics, and historical and genealogical studies.



Kinship Verification Framework

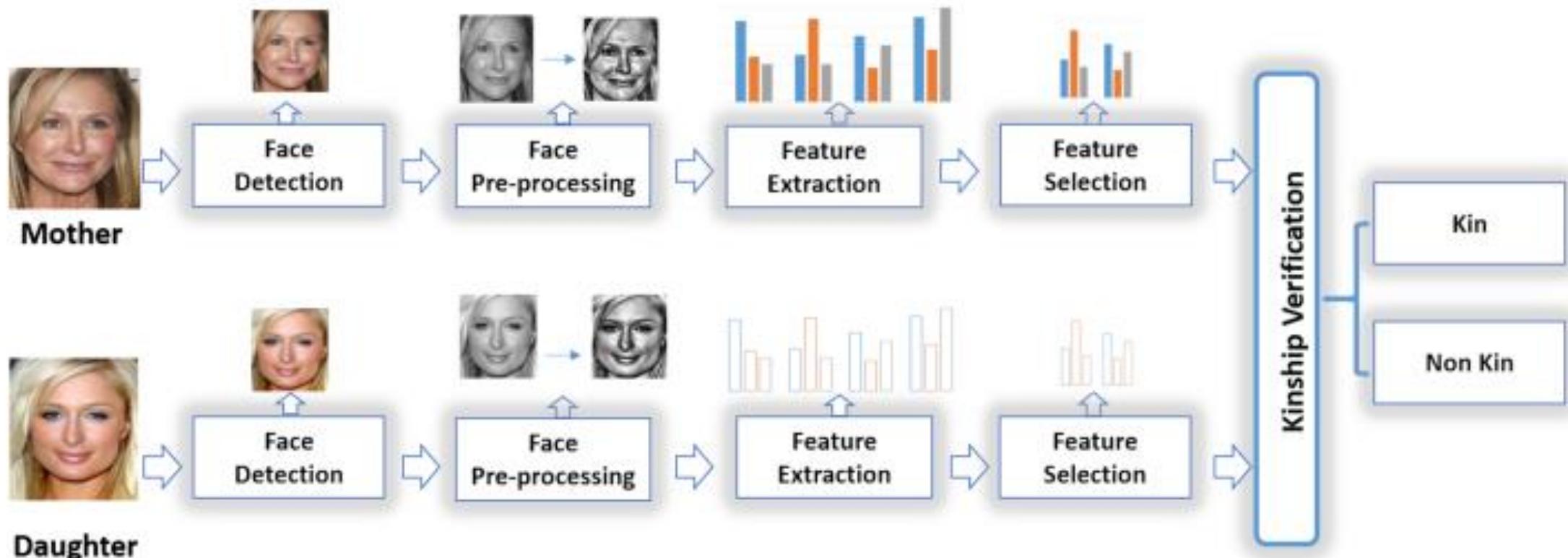
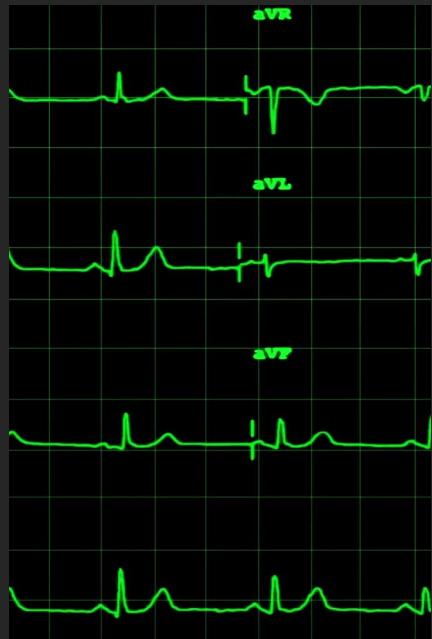


Figure 1 A general KVR framework (Ruogu et al., 2013).

Full-size DOI: 10.7717/peerj-cs.735/fig-1

Stage 1 : Face Detection



- ❖ Active Appearance Model (AAM)
- ❖ Boosted Cascade Of Simple
- ❖ Adaboost Face Detector
- ❖ Fiducial Points Detection
- ❖ Viola and Jones Algorithm
- ❖ Skin Color Model-based Algorithm
- ❖ Successive Mean Quantization Transform (SMQT) Features
- ❖ Sparse Network of Winnows (SNOW) Classifier Method
- ❖ Neural Network-Based Face Detection

Stage 2 : Face Pre-processing

- ❖ Adaptive Histogram Equalization
- ❖ Logarithm Transform (LOG)
- ❖ Gamma Intensity Correction (GIC)



Stage 3 : Feature Extraction

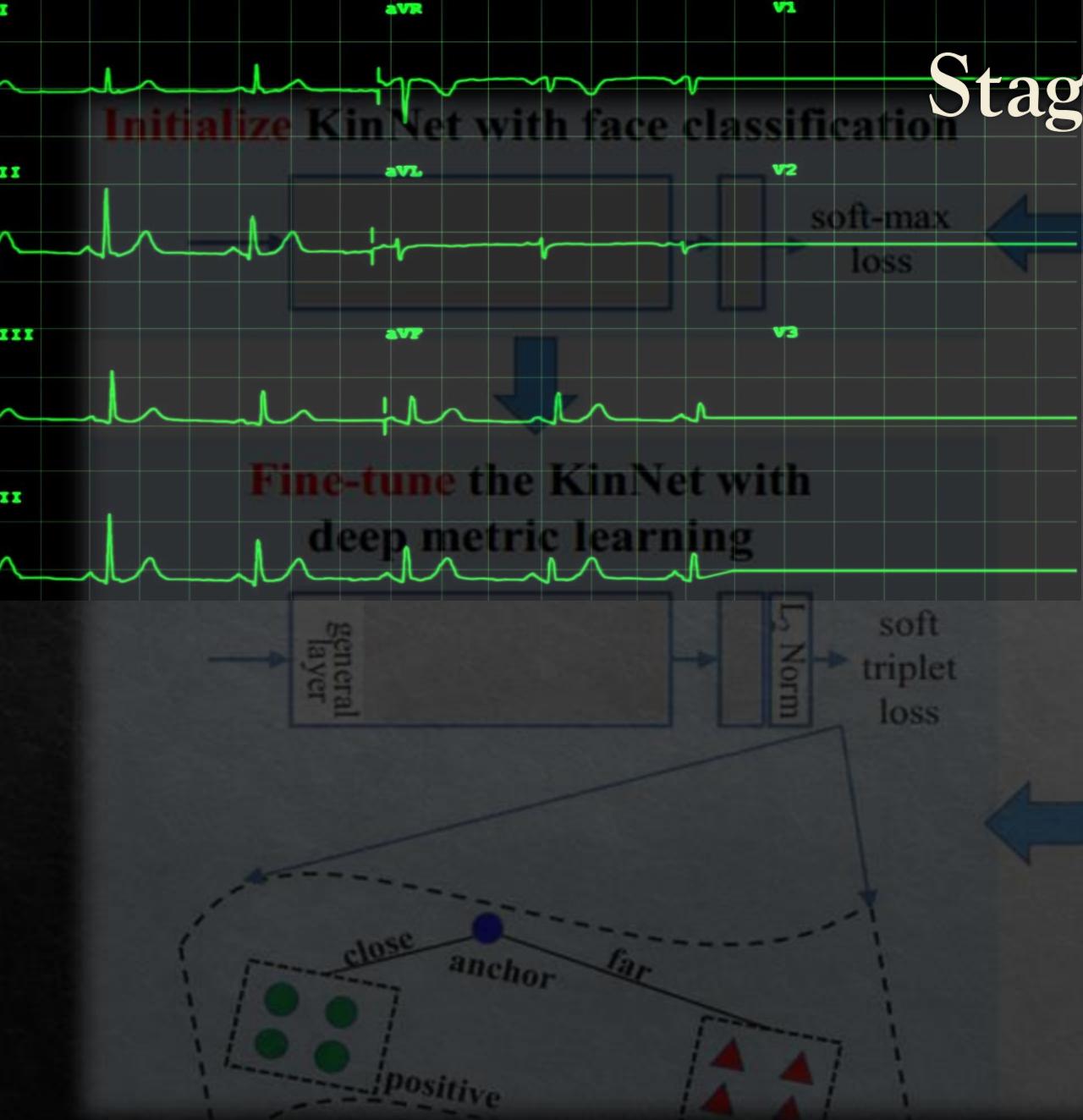
- ❖ Histogram Of Oriented Gradient (HOG)
- ❖ Local Binary Patterns (LBP)
- ❖ Compound Local Binary Pattern (CLBP)
- ❖ Three-Patch LBP (TPLBP)
- ❖ Four-Patch LBP (FPLBP)
- ❖ Scale Invariant Feature Transform (SIFT)
- ❖ Gabor
- ❖ Grey-level Co-occurrence Matrix (GLCM)
- ❖ Completed Joint Scale Local Binary Pattern (CJLBP)
- ❖ Weber Local Descriptor (WLD)
- ❖ Local Phase Quantization (LPQ).

Stage 4 : Feature Selection

- ❖ Minimum Redundancy Maximum Relevance (mRMR)
- ❖ Fisher's Score
- ❖ Sequential Forward Selection (SFS)



Stage 5 : Kinship Verification



41856 subjects with ~3010k images

◆ K-NearestNeighbor (KNN)

Kinship verification dataset



Dataset Augmentation



Current Limitations

- ❖ Illumination
- ❖ Occlusion
- ❖ Facial Expressions
- ❖ Pose Variation
- ❖ Clutter
- ❖ Low Resolution

Future Direction

- ❖ Age & Gender Variation

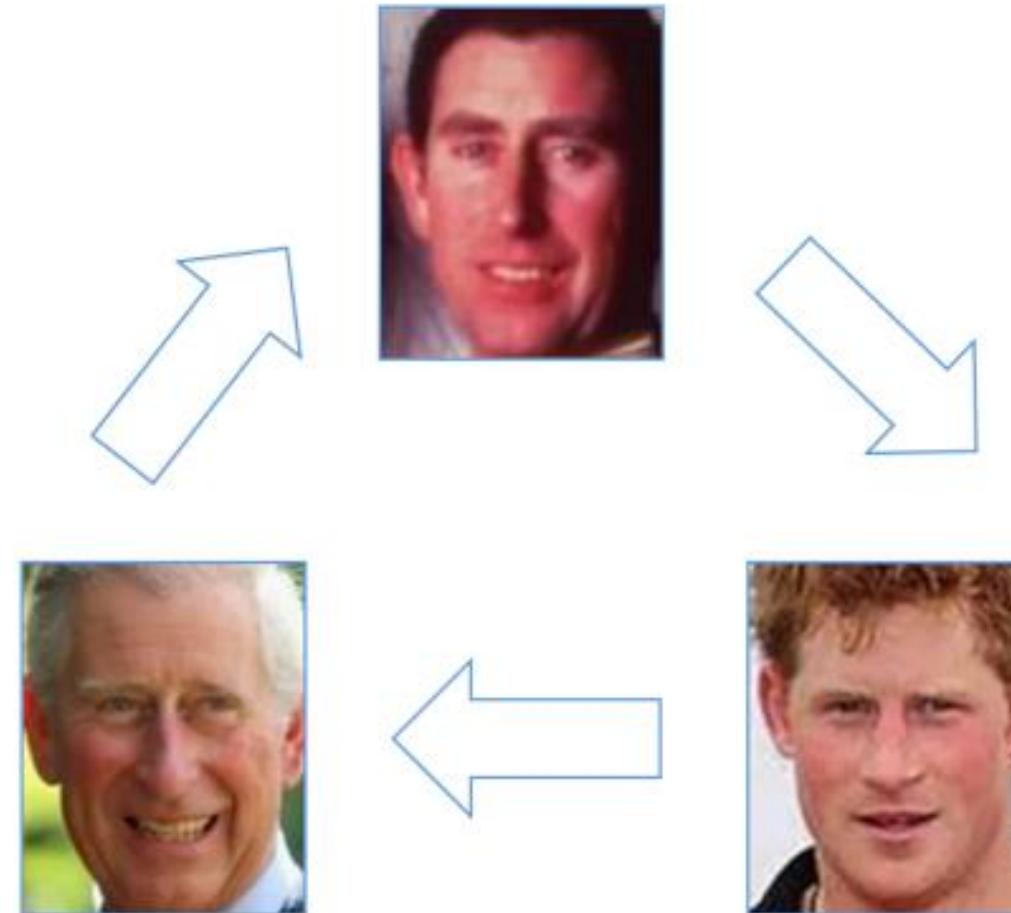


Figure 14 Kinship verification using mediator image ([Ruogu et al., 2013](#)).

Full-size DOI: [10.7717/peerj-cs.735/fig-14](https://doi.org/10.7717/peerj-cs.735/fig-14)

THANKYOU

- ❖ References :
- ❖ <https://link.springer.com/article/10.1007/s00138-022-01341-7>
- ❖ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8670373/>
- ❖ <file:///C:/Users/aishu/Downloads/212Kinshipverificationandrecognitionbasedonhandcraftedanddeeplearningfeature-basedtechniques.pdf>
- ❖ <https://towardsdatascience.com/demo-for-rfiw-2020-task-1-kinship-verification-8a8ed7081bcc>
- ❖ <https://towardsdatascience.com/families-in-the-wild-track-iii-b5651999385e#33d0>