

Kin Recognition Using Weighted Graph Embeddings

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Problem Statement and Solution

Given two or three images of people's faces and a relationship, we want to be able to say if the people in the pictures have that given relationship. For example, given the following pair of images:



We want to be able to tell that they are mother and daughter. To do this, we are implementing the paper "Weighted Graph Embedding-Based Metric Learning for Kinship Verification" and verifying their results.

What's Been Accomplished

- ▶ **Face Detection:** The ability to detect faces and save them as 64×64 images
- ▶ All of the face descriptors were implemented: **LBP, HOG, SIFT-variant, VGG**
- ▶ The main algorithm, **WGEML**, was implemented
- ▶ Scripts to run the **training and testing** end to end were written
- ▶ Ablation study of changing the inputted face descriptors

Results

The actual accuracies obtained were as follows:

Dataset	Setting	FS	FD	MS	MD	FMS	FMD	avg
KinFaceW-I	Unrestricted	0.8015	0.7166	0.7628	0.7921			0.76825
KinFaceW-I	Restricted	0.811	0.7391	0.7405	0.769			0.7649
KinFaceW-II	Unrestricted	0.846	0.764	0.814	0.8			0.806
KinFaceW-II	Restricted	0.838	0.768	0.802	0.8			0.802
TSKinFace	Only Pos Pairs	0.9201	0.8826	0.9162	0.9182	0.9571	0.9343	0.9214
TSKinFace	Neg In Test/Train	0.8409	0.8203	0.8242	0.8362	0.8664	0.843	0.839

These differ from the paper's results as follows, in terms of percentage:

Dataset	Setting	FS	FD	MS	MD	FMS	FMD
KinFaceW-I	Unrestricted	1.65	-2.24	-4.32	-2.69		
KinFaceW-I	Restricted	2.2	0.71	-5.35	-3.8		
KinFaceW-II	Unrestricted	-4	-1	-2	-1.6		
KinFaceW-II	Restricted	-4.4	-0.6	-3	-2.4		
TSKinFace	Only Pos Pairs	1.71	-1.54	0.22	1.42	2.21	0.43
TSKinFace	Neg In Test/Train	-6.21	-7.77	-8.98	-6.78	-6.86	-8.69

Next Steps

- ▶ Extending the functionality to work with videos
- ▶ Using a different, smaller network than VGG for one of the face descriptors
- ▶ Another ablation study to hide parts of the input image and see how that affects the results