Kin Recognition Using Weighted Graph Embeddings

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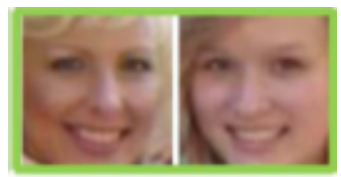
Problem Statement and Solution

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

Results

The actual accuracies obtained were as follows:

Dataset	Restricted	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	-	0.9201	0.8826	0.9162	0.9182	0.9571	0.9343	0.9214

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

Dataset	Restricted	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	-	1.71	1.54	0.22	1.42	2.21	0.43

Next Steps

- Ablation studies
- Extending the functionality to work with videos
- Testing how adding different face descriptors affects it
- Experimenting slight modifications in some existing face descriptors to see how it impacts performance
- Using a different, smaller network than VGG for one of the face descriptors