A Graph Based Approach for Naming Faces in News Photos

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Overview

Goals:
- Face recognition on the large scale using multi modal information
- Association of names and faces for querying people in large news photo collections.

Problems:
- The usual way: search for the name of the queried person in the caption.

Assumptions:
- A person’s face frequently appears around his/her name.
- The conditions or the poses can vary, but the different representations of the face of the same person tend to be more similar to each other than to the faces of others.

Approach

Step I: Select all the faces associated with the query name (i.e. George W Bush).

Step II: Find dissimilarities among those faces and represent them in a graph structure. Nodes are faces, edge weights are dissimilarities.

Step III: Find the densest component in this graph, which corresponds to the faces of the queried person.

Finding Densest Component

First, convert weighted dissimilarity graph to a binary one by using a threshold: 1 = edge, 0 = no edge

Then find subset \( S \) in \( G \) with max \( f(S) \) value, where \( E(S) = \{ (i, j) \in E : i \in S, j \in S \} \) and \( E \) is the set of all edges in \( G \). (Charikar-APPROX'2000)

Experiments

- 30,281 detected faces from captioned news images collected from Yahoo! News. (Berg-NISP'2004)
- Each image is associated with a set of names. 13,292 names are used for association.
- More than half (9,609) of the names are used only once or twice.
- A particular person may be called by different names.
- In experiments, top 23 people whose name appear more than 200 times are used.

Similarity Measure Between Two Faces

- Faces are represented by the interest points extracted from the images using the SIFT operator.
- Points on the first face are compared with the points on the second face. Initially, points having the least Euclidean distance are assumed to be the correct matches.
- Then, two constraints are applied on those matches:

I) Geometrical Constraints
presumes that the matching pair of points will be in close proximity when the normalized coordinates (the relative position of the points on the faces) are considered.

II) Unique Match Constraints
eliminate one way assignments and multiple assignments to a point.

Discussion and Future Work

- Compared to solely text-based methods, over 20% increase in precision is achieved.
- Other representations or similarity measures can also be used to construct the dissimilarity graph.
- A method, which does not violate the weighted graph property, may yield better results.