Exploratory GMDS Integration

Roy Schestowitz

August 19, 2011

Code was customised and integrated into the main framework with the aim of putting it in a dimensionality reduction algorithm of another type, alongside signal of nature other than geometric (and geometry-invariant). If done improperly or applied to faces of different people (as the figures below show), it can be demonstrably shown that the resultant correspondence is rather poor. The data dealt with in this case is illustrated in Figure 1. Figure 3 shows this with $N = 50$ and Figure 3 shows the same for $N = 100$. Conversely, as seen in Figure 4, even with $N = 20$ the found correspondence is considerably better *when handling images acquired of the same person*.

Positive pairs/matches are shown in figures 5 and 6, but in the former case (merely the first image in the set) imprecision can be seen, whereas in the latter there is bad data creeping in, leading to serious problems when trying to pipe it into PCA and deal with GMDS as a similarity measure within the larger framework.

By resolving issues associated with fatal exceptions in the pipeline it should be trivial to utilise the generalised MDS, which by far simplifies experiments performed with MDS (still part of the program, at least as an option to be explored or compared to later).

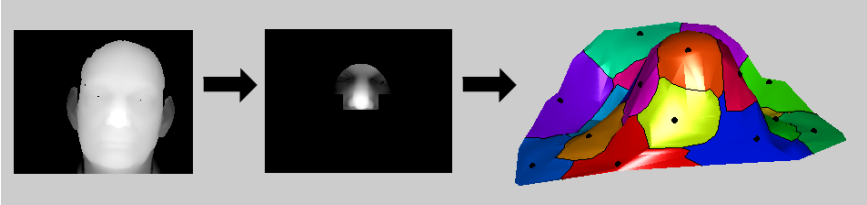

Figure 1: Transformation from 3-D face (left) to a subset of rigid parts and then GMDS handling of the underlying surface (right)

Figure 2: Nose and eye regions from different people (FRGC 2.0) as treated by GMDS ($N = 50$)

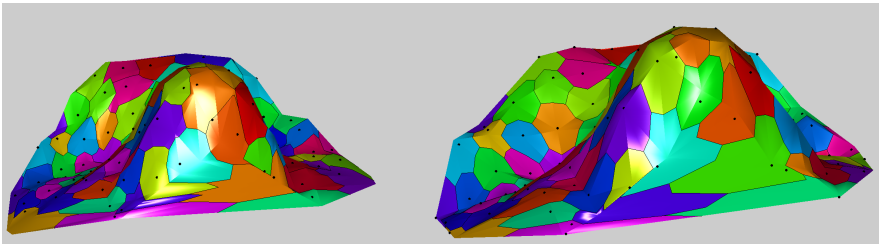

Figure 3: Nose and eye regions from different people (FRGC 2.0) as treated by GMDS when $N = 100$

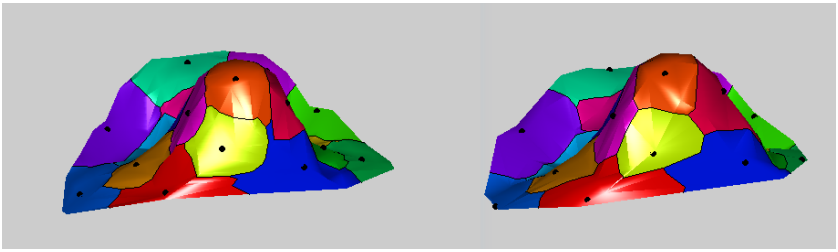

Figure 4: Nose and eye regions of the same person (FRGC 2.0) as treated by GMDS

Figure 5: The first pair in the set of real matches (same person in different poses)

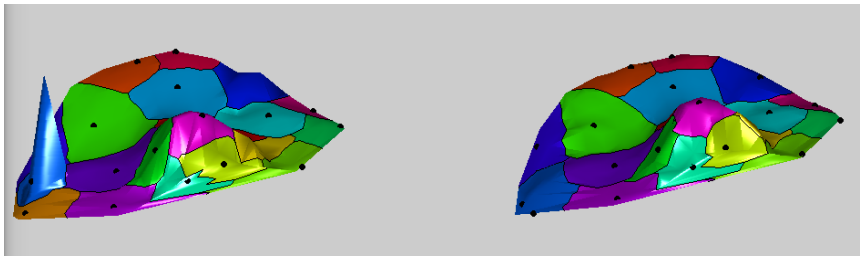

Figure 6: An example of a problematic pair with a false signal spike (left)