This is the readme file for the R script "JRSS C codes jaw data", which contains R codes related to Section 6.2, Test Results for Smile Data 2: Effect of Surgery, in the paper. In this section, the pre-surgery data are compared with the post-surgery data.

The codes have been divided into 7 chunks with indices ranged from 0 to 6.

**Code chunk 0** contains the codes for reading in the data. The pre- and post-surgery data for the 22 subjects are saved in two lists with names "jaw\_pre" and "jaw\_post" respectively. Each element in these two lists is a matrix, with rows for frames and 60 columns for the coordinates of 20 landmarks.

**Code chunk 1** involves data for some processing of the data. The data for different subjects have different frames, so we standardize them to 13 frames and select 3 frames from them: the first, middle and last frames (same as the cleft lip data). Further, the data for each frame should be reshaped to 20\*3 matrices for following analyses. This chunk is divided into 2 sub-chunks:

(a). 1.1, where the frames are standardized and saved in two lists with names "jaw\_pre\_std" and "jaw\_post\_std" for the pre- and post-surgery data respectively.

(b). 1.2, where the three frames and selected and the data have been reshaped. The resulted data are saved in 6 arrays for pre- and post-surgery data at the three frames, which are

(1). jawpre\_std\_arr\_fir;

(2). jawpre\_std\_arr\_mid;

(3). jawpre\_std\_arr\_la,

(above for the pre-surgery data) and

(4). jawpost\_std\_arr\_fir;

(5). jawpost\_std\_arr\_mid;

(6). jawpost\_std\_arr\_la

(above for the post-surgery data).

**Code chunk 2** contains codes for computing the signed elementary feature vectors defined in equations (2.1) - (2.3) in Section 2.2. These vectors have been saved in 6 matrices (rows are for subjects and columns are for the features):

(1). d\_pre\_fir\_uplip;

(2). d\_pre\_mid\_uplip;

(3). d\_pre\_la\_uplip,

(above for pre-surgery data at the three frames) and

(4). d\_post\_fir\_uplip;

(5). d\_post\_mid\_uplip;

(6). d\_post\_la\_uplip

(above for post-surgery data at the three frames).

**Code chunk 3** contains the codes for computing the three composite scores. This chunk has been divided into three sub-chunks:

(a). 3.1, where \phi^\*\_{L\_1} defined in equation (3.9) in Section 3.1 is calculated for pre- and post-surgery data. The results are saved in 2 matrices: "phistar\_L1\_pre\_uplip" and "phistar\_L1\_post\_uplip", where the rows are for subjects and columns are for the scores at the three frames.

(b). 3.2, where \phi\_{L\_1} defined in equation (3.6) in Section 3.1 is calculated for pre- and post-surgery data. The results are saved in 2 matrices: "phi\_L1\_pre" and "phi\_L1\_post", where the rows are for subjects and columns are for the scores at the three frames.

(c). 3.3, where \phi\_{L\_2} defined in equation (3.7) in Section 3.1 is calculated for pre- and post-surgery data. The results are saved in 2 matrices: "phi\_L2\_pre" and "phi\_L2\_post", where the rows are for subjects and columns are for the scores at the three frames.

**Code chunk 4** contains the codes for executing univariate tests, where paired t-tests (see chunk 4.1) and Wilcoxon signed rank tests (see chunk 4.2) are carried out.

**Code chunk 5** contains codes for performing feature selection, where the procedures are introduced in Section 3.2. This chunk is divided into 2 sub-chunks:

(a). 5.1, where the paired t-values are computed at the three frames and saved with names "tval\_uplip\_fir", "tval\_uplip\_mid" and "tval\_uplip\_la" respectively.

(b). 5.2, where permutation tests are performed at the three frames separately.

**Code chunk 6** are divided into 3 sub-chunks:

(a). 6.1, where the separate p-values are computed and saved with names "p\_wilcox\_uplip\_fir", "p\_wilcox\_uplip\_mid" and "p\_wilcox\_uplip\_la" respectively.

(b). 6.2, where Fisher's method is carried out.

(c). 6.3, where Pearson's method is performed.