

# isxavg-fe

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## 1 Introduction

**isxavg-fe** is a program for intersubject averaging using a *fixed-effects model* in which all the data from all subjects are treated as if they came from a single subject (see **isxavg-re** for random effects model). It operates on the output of *selxavg*, and produces the same set of files. Requires matlab 5.2 or higher.

In the within-subject analysis (*selxavg*), the parameters for each subject  $i$  are estimated (assuming white noise) by

$$\beta = (X'X)^{-1}X'y, \quad (1)$$

where  $y$  is the input data, and  $X$  is the design matrix which codes when each stimulus was presented as well as any assumption about the event response. The covariance of  $\beta$  (for noise of variance 1) is

$$CoVar(\beta) = \Sigma_{\beta} = (X'X)^{-1} \quad (2)$$

The variance of the residual error is estimated from

$$Var(e_r) = \hat{\sigma}_n^2 = Var(y - X\beta) = Var(y - (X'X)^{-1}X'y) \quad (3)$$

In the fixed-effects model, these three quantities are computed for a group of subjects/sessions from those of the individuals:

$$\beta_{ffx} = \frac{1}{N_s} \sum \beta_i \quad (4)$$

$$CoVar(\beta_{ffx}) = \Sigma_{\beta_{ffx}} = \left( \sum \Sigma_{\beta_i}^{-1} \right)^{-1} \quad (5)$$

$$\hat{\sigma}_n^2 = \frac{\sum \sigma_{n_i}^2 DOF_i}{\sum DOF_i} \quad (6)$$

## 2 Usage

Typing **isxavg-fe** at the command-line without any options will give the following message:

```
USAGE: isxavg-fe [-options] -i instem1 -i instem2 <...> -o outstem
  instem1  - prefix of first .bfloat selxavg input files
  instem2  - prefix of second .bfloat selxavg input files
  ...
  outstem  - prefix of .bfloat isxavg-fe output files
Options:
  -firstslice <int>  : first slice to process <0>
  -nslices <int>    : number of slices to process <auto>
  -umask <mask>     : set umask before running
  -monly mfile      : dont run, just create a matlab script file
```

### 3 Command-line Arguments

**-i instem1:** stem of the volume in which the results of the selective averaging for the first subject have been stored (see `selxavg`). There must be at least two input volumes, each preceded by a `-i` flag.

**-o outstem:** stem of the output volume. The format will be the same as the input volumes, and `isxavg-fe` will also produce appropriate `dof`, `dat`, and `hdr` files.

**-firstslice int:** first *anatomical* slice to process (usually 0). This should not be confused with the first *functional* slice.

**-nslices int:** total number of *anatomical* slices to process.

**-umask:** specify the unix file access permissions with which the output files and directories will be created. Using `-umask 0` will instruct `isavg-fe` to create files that are world-writable. This can be convenient when collaborating with other users.

**-monly:** only generate the matlab file which would accomplish the analysis but do not actually execute it. This is mainly good for debugging purposes.