CENTRO DI ATENEO
PADOVA NEUROSCIENCE CENTER

Direttore Prof. Maurizio Corbetta

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UNIVERSITÀ DEGLI STUDI DI PADOVA

SEMINAR BY PROF. LIVIO FINOS
(Dipartimento di Psicologia dello Sviluppo e della Socializzazione-DPSS)
January 30th, 2020
3:00 p.m. – 4:00 p.m.
Seminar Hall at VIMM (Via G. Orus, 2 - Padova)

Title of the Seminar: *Functional Alignment of fMRI exploiting prior information*

Abstract: Multi-subject functional Magnetic Resonance Image (fMRI) studies are critical to test the validity of findings across subjects. However, the anatomical and functional structure varies across subjects, hence the image alignment is a fundamental step.

One anatomical alignment is the Talairach Atlas, thus, it doesn't account for functional topography. For that, Haxby et al. (2011) developed a functional approach called Hyperalignment, using sequential Procrustes orthogonal transformations. The inter-subject classification of functional response is improved. However, any constraint isn't imposed to the transformation, losing results interpretability.

In this contribution, we give a brief introduction to problem of functional alignment, then we tackle it from a statistical perspective. A probabilistic model for the data generating process is defined. The maximum likelihood estimates of the rotation parameters result to be the Generalized Procrustes Problem (GPA), which improves the Hyperalignment in terms of residuals sum of squares. Furthermore, the statistical framework allows assuming a prior distribution of the orthogonal transformation parameter, hence embedding the anatomical information in the estimation of the parameters.

The application to several datasets shows that the proposed method improves the classification accuracy of task-related images with respect to the anatomical alignment and the Hyperalignment methods.

Keywords
fMRI data; Multi-subject studies, Hyperalignment; Procrustes Analysis, Bayesian modeling

Bio: Livio Finos is Associate Professor at the University of Padova. Previously he has been Assistant Professor ('08-'14) at Department of Statistical Sciences University of Padua (SSD secs-s/01) and Researcher at Department of Medical Statistics and Bioinformatics at the Leiden University Medical Center (NL). As a post-doc, he has held positions at CIBB, University of Roma "Tor Vergata" (2007- 2008) and at University of Ferrara. He received his M.S. in Demographic Statistics and Statistics for the Social Sciences (2000) and his Ph.D. in Statistics (2004) from the University of Padua.

His expertise is on nonparametric statistical methods for multivariate inference, specially multivariate permutations tests and multiple testing.
The application fields range from neuroscience to behavioral psychology, from the biostatistics to ecology, from text mining to big (web) data.

https://livioivil.github.io/

http://dpss.psy.unipd.it/psicostat/