

Resting state fMRI and ICA

- Introduction to resting state
- Independent Component Analysis
- Single-subject ICA
- Multi-subject ICA
- Dual regression



Artefact detection

- FMRI data contain a variety of source processes
- Artifactual sources typically have unknown spatial and temporal extent and cannot easily be modelled accurately
- Exploratory techniques do not require a priori knowledge of time-courses and spatial maps



FSLeyes Melodic Mode

Lightbox View I Coscily Bightboxs Contrast	
Note: Second	8
Unclossified noise Melodic IC classification Image: Components Labels Image: Components Labels Image: Components Labels Image: Components Imag	
Image: C # Labels Image: C # Labels <t< td=""><td>8</td></t<>	8
Image: Construction of the second	
Load labels Save labels Clear I	als
Overlay list Location 	8
Time series 2 8 Power spectra 3	8
P Image: Color of the state of the s	11]



motion





cardiac





susceptibility motion





multiband











effects of scan parameters





manual classification



Griffanti et al (2016).

https://doi.org/10.1016/j.neuroimage.2016.12.036



semi-automatic classification



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- FIX (fsl.fmrib.ox.ac.uk/fsl/fslwiki/FIX)
 - Classifier with many features
 - Requires manually labelled training data
 - 99% accuracy on high-quality data



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 - Classifier with many features
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- ICA-AROMA (github.com/rhr-pruim/ICA-AROMA)
 - Simple classifier with only 4 features
 - No training data required
 - Mainly designed for motion artefacts



ICA-based denoising



















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