MRC | Cognition and Brain Sciences Unit

aa 5:
new features

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- **Subject name**
- **Economy**
- **BIDS**
- **First level contrast**

https://github.com/rhodricusack/automaticanalysis/blob/v5-devel/CHANGELOG.md

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Subject name

- **Subject name:**
  - Explicit subject identifier
  - Stored in *aap.acq_details.subjects.subjname*

↓

  - **Unambiguously** specified à can be used as a reference in the whole UMS
    - aas_addevent, aas_add_meg_event, aas_addcovariate, aas_addcontrast, etc.
  - **Not tied** to the data à Longitudinal/multi-visit measurement
    - Session-specific fieldmaps

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Subject name

- ***aas_addsubject***
  - More intuitive **parameterisation** (*help aas_addsubject)*
  - Multiple call to add more sources to a particular subject

- ***aa_convert_subjects:***
  - **Pre-v5** UMSs and pipelines are **not compatible** with v5

↓

  - Scripting: converts *aap* structure stored *aap_parameters.mat*
  - Connecting to a remote pipeline: is automatically called

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- **Economy**
  - Deployment – lightweighting:
    - Externals: ANTs + VBM8 + FreeSurfer deface templates = -170MB (95%)!
    - Removing and marking them as (optional) requirements
  - Running:
    - In case of *selected_session*, only relevant inputs will be retrieved

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BIDS

- **BIDS**
  - Brain Imaging Data Structure (BIDS) is a new standard for organizing results of a human neuroimaging experiment.
  - http://bids.neuroimaging.io

- **Advantages for**
  - PI: More than one person working on the same data over time
  - User: Software aware of the data structure à less manual entry
  - Developer: Data structure can be expected
    - Already process BIDS: aa, Nipype, C-PAC
  - Database: Easier to share/exchange data
    - Already accept BIDS: COINS, LORIS , OpenfMRI.org, SciTran, XNAT
    - Some journals require data sharing
    - Validator tool

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BIDS

```
sub-control01/
  anat/
    sub-control01_T1w.nii.gz
    sub-control01_T1w.json
    sub-control01_T2w.nii.gz
    sub-control01_T2w.json
  func/
    sub-control01_task-nback_bold.nii.gz
    sub-control01_task-nback_bold.json
    sub-control01_task-nback_events.tsv
    sub-control01_task-nback_cont-physio.tsv
    sub-control01_task-nback_cont-physio.json
    sub-control01_task-nback_sbref.nii.gz
  dwi/
    sub-control01_dwi.nii.gz
    sub-control01_dwi.bval
    sub-control01_dwi.bvec
  fmap
    sub-control01_phasediff.nii.gz
    sub-control01_phasediff.json
    sub-control01_magnitude1.nii.gz
  sub-control01_scans.tsv
README
CHANGES
dataset_description.json
participants.tsv
```

- **Metadata**
  - Folder structure
  - Filename

} some redundancy

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BIDS

- **Metadata**
  - Folder structure
  - Filename

  } some redundancy

  - JSON files for key–value pairs

```
{
    "RepetitionTime": 3.0,
    "EchoTime": 0.03,
    "FlipAngle": 78,
    "SliceTiming": [0.0, 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4,
                    1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8],
    "InPlanePhaseEncodingDirection": "AP“
    "TaskName": “nback"
}
```

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BIDS

- **Don’t rely on external software or complicated file formats**
  - Use of compressed NIFTI files for imaging data. 
  - Use of tab separated files for tabular data (demographics, events). 
  - Use of legacy text file formats for b vectors/values

```
participant_id age sex
sub-001        34  M
Sub-002        12  F
Sub-003        33  F
```

```
onset  duration trial_type ResponseTime
1.2    0.6      go         1.435
5.6    0.6      stop       1.739
…
```

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BIDS

- **Brain Imaging Data Structure (BIDS) as input:**

```
% Add data
aap.directory_conventions.rawdatadir = '/imaging/ta02/Temp/BIDS/ds114';
aap = aas_processBIDS(aap);
```

↓

  - For: functional, structural, diffusion

  - Adds sessions
  - Adds subjects
  - Adds events

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First level contrast

- **Multi-session contrast**
  - *'sessions:<session name>[+<session name>[...]]'*
  - E.g.:
    - *'sessions:run01+run02'*
    - *'sessions:run01+run03'*

- **Contrast with condition names**
  - '<weight>x<regressor name>[<main ('m') or parametric ('p')><number of basis/parametric function>]'
  - N.B.: It requires **regressor names with UPPERCASE** letters only!
  - E.g.:
    - *'+1xTASK|-1xREST'*
    - *'+1xTASKp1|-1xRESTm1'*

Info/Support

Website: http://automaticanalysis.org
GitHub: https://github.com/rhodricusack/automaticanalysis/blob/v5-stable/README.md
GitWiki: https://github.com/rhodricusack/automaticanalysis/wiki
Our Wiki: http://imaging.mrc-cbu.cam.ac.uk/imaging/AA

Maasters