Run **all** your fMRI univariate analysis with **one JSON file** and **50 lines of code**.

bidspm: an SPM centric BIDS app

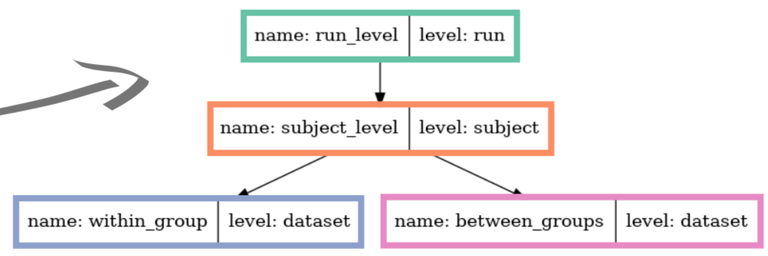
Standardized inputs

```
sourcedata
    fmriprep   BIDS
    raw        BIDS
derivatives
    bidspm-preproc
models
    smdl.json  BIDS
```

BIDS stats model

```
{ "Name": "auditory motion localizer analysis",
 "BIDSModelVersion": "1.0.0",
 "Input": {"task":   ["Motion"],
         "space":  ["MNI152NLin6Asym"]},

"Edges": [{ "Source":         "run_level",
            "Destination":  "subject_level"},
          { "Source":         "subject_level",
            "Destination":  "between_groups"},
          { "Source":         "subject_level",
            "Destination":  "within_group"}],

 "Nodes": [
  {
   "Level":      "Run",
   "Name":       "run_level",
   "GroupBy":  ["run", "subject"],

   "Model":     {"X":      ["Motion", "Static", "trans_?", "rot_?"],
                 "HRF":  { "Variables": ["Motion", "Static"],
                           "Model":     "spm"},
                 "Type":  "glm",
                 "Software":
                  {"bidspm":
                    {"Results": [{"name": ["Motion_gt_Static"],
                                  "MC": "FWE",
                                  "p": 0.05,
                                  "k": 10,
                                  "nidm": true}]}}},

   "Contrasts": [{ "Name":           "Motion_gt_Static",
                   "ConditionList": ["Motion", "Static"],
                   "Weights":        [1          , -1      ],
                   "Test":           "t"}]
  },
  {
   "Level":                "Subject",
   "Name":                 "subject_level",
   "GroupBy":             ["contrast", "subject"],
   "Model":               {"X": [1], "Type": "glm"},
   "DummyContrasts": {"Test": "t"}
  },
  {
   "Level":       "Dataset",
   "Name":        "within_group",
   "GroupBy":  ["contrast", "group"],
   "Model":      { "X": [1], "Type": "glm"},
   "DummyContrasts": {"Test": "t"}
  },
  {
   "Level":       "Dataset",
   "Name":        "between_groups",
   "GroupBy":    ["contrast"],
   "Model":      { "Type":   "glm",
                   "X":      [1, "group"]},
   "Contrasts":  [{ "Name":           "grp_1_gt_grp_2",
                    "ConditionList":  ["group.GRP_1", "group.GRP_2",
                    "Weights":        [1                , -1
                    "Test":           "t"}]
  }]}
```

Directed acyclic graph



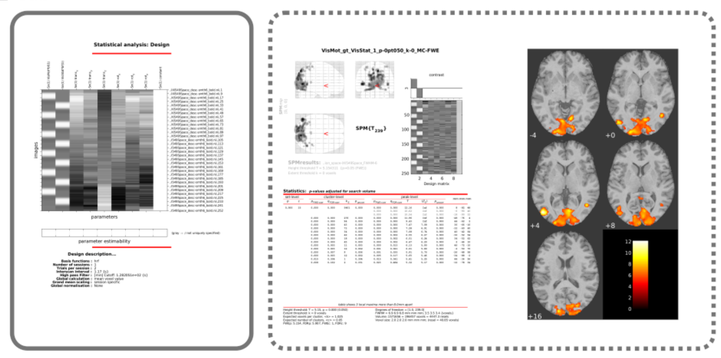
BIDS app API

```
%% smooth
bidspm(fmriprep_dir, ...
       derivatives, ...
       'subject', ...
       'action', 'smooth', ...
       'task', {'Motion'}, 'space', ...
       {'MNI152NLin6Asym'}, 'fwhm', 6);

%% stat
bidspm(bids_dir, derivatives, 'subject',
       'action', 'stats', ...
       'preproc_dir', preproc_dir,
       'model_file', model_file, ...
       'fwhm', 6);

bidspm(bids_dir, derivatives, 'dataset',
       'action', 'stats', ...
       'preproc_dir', preproc_dir,
       'model_file', model_file, ...
       'fwhm', 6);
```

```
docker run -it --rm \
    -v $sourcedata:/sourcedata \
    -v $derivatives:/derivatives \
    -v $model_dir:/models \
        cpplab/bidspm:latest \
            /sourcedata/raw \
            /derivatives \
            subject \
            --action stats \
            --preproc_dir /derivatives/bidspm-preproc \
            --model_file /models/smdl.json \
            --fwhm 6
```

Outputs

```
sub-{sub}
  task-{task}_space-{space}_FWHM-{fwhm}
    SPM.mat
    sub-{sub}_*_designmatrix.png
    sub-{sub}_task-{task}_desc-confounds_timeseries.tsv
    sub-{sub}_task-{task}_onsets.tsv
    beta_*.nii
    con_*.nii
    spmT_*.nii
    spm_*.png
    spm_*.tsv
    sub-{sub}_*_p-{p}_k-{k}_MC-{mc}_montage.png
sub-*
derivatives
  bidspm-groupStats
    *_task-{task}_space-{space}_FWHM-{fwhm}_contrast-{contrast}
      SPM.mat
      *_designmatrix.png
      beta_*.nii
      con_*.nii
      spmT_*.nii
      spm_*.png
      spm_*.tsv
      *.nidm.zip
```



Standardized outputs

Share your results in a few clicks.

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Other features

- ROI based glm (marsbar)
- Bayesian model comparison (MACS)

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