

# Package ‘ARIBrain’

July 21, 2025

**Version** 0.2

**Date** 2018-07-27

**Title** All-Resolution Inference

**Author** Livio Finos, Jelle Goeman, Wouter Weeda, Jonathan Rosenblatt, Aldo Solari

**Maintainer** Livio Finos <livio.finos@unipd.it>

**Description** It performs All-Resolutions Inference (ARI) on functional Magnetic Resonance Image (fMRI) data. As a main feature, it estimates lower bounds for the proportion of active voxels in a set of clusters as, for example, given by a cluster-wise analysis. The method is described in Rosenblatt, Finos, Weeda, Solari, Goeman (2018) <[doi:10.1016/j.neuroimage.2018.07.060](https://doi.org/10.1016/j.neuroimage.2018.07.060)>.

**License** GPL (>= 2)

**RoxygenNote** 6.0.1

**Suggests** knitr, rmarkdown

**Imports** hommel, RNifti, plyr

**VignetteBuilder** knitr

**NeedsCompilation** no

**Repository** CRAN

**Date/Publication** 2018-08-01 12:20:02 UTC

## Contents

|                             |          |
|-----------------------------|----------|
| ARIBrain-package . . . . .  | 2        |
| ARI . . . . .               | 2        |
| cluster_threshold . . . . . | 3        |
| <b>Index</b>                | <b>5</b> |

### Description

It performs All-Resolutions Inference on fMRI data. As a main feature, it estimates lower bounds for the proportion of active voxels in a set of clusters as, for example, given by a cluster-wise analysis.

### Author(s)

all of us

### Examples

```
pvalue_name <- system.file("extdata", "pvalue.nii.gz", package="ARIbrain")
cluster_name <- system.file("extdata", "cluster_th_3.2.nii.gz", package="ARIbrain")
zstat_name <- system.file("extdata", "zstat.nii.gz", package="ARIbrain")
mask_name <- system.file("extdata", "mask.nii.gz", package="ARIbrain")

ARI(Pmap = pvalue_name, clusters= cluster_name,
    mask=mask_name, Statmap = zstat_name)
```

### Description

Valid Circular Inference (ARI) for Brain Imaging

### Usage

```
ARI(Pmap, clusters, mask = NULL, alpha = 0.05, Statmap = function(ix)
    -qnorm(Pmap[ix]), summary_stat = c("max", "center-of-mass"),
    silent = FALSE)
```

### Arguments

|          |                                                                                                                                                                                            |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pmap     | 3D array of p-values or a (character) nifti file name.                                                                                                                                     |
| clusters | 3D array of cluster ids (0 when voxel does not belong to any cluster) or a (character) nifti file name.                                                                                    |
| mask     | 3D array of locicals (i.e. TRUE/FALSE in/out of the brain). Alternatively it may be a (character) nifti file name. If mask=NULL, it is assumed that non of the voxels have to be excluded. |

|              |                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| alpha        | Significance level. alpha=.05 by default.                                                                                                                                                                                                                                                                                          |
| Statmap      | Statistics (usually t-values) on which the summaries are based. Can be either a 3D array, a (character) nifti file name or a function with argument ix used in the function to select the voxels belonging to a given cluster. By default Statmap = function(ix) -qnorm(Pmap[ix]) which convert the p-values in one-sided z-score. |
| summary_stat | Choose among =c("max", "center-of-mass").                                                                                                                                                                                                                                                                                          |
| silent       | FALSE by default.                                                                                                                                                                                                                                                                                                                  |

### Value

A matrix reporting Size, FalseNull, TrueNull, ActiveProp and other statistics for each cluster.

### Examples

```
pvalue_name <- system.file("extdata", "pvalue.nii.gz", package="ARIBrain")
cluster_name <- system.file("extdata", "cluster_th_3.2.nii.gz", package="ARIBrain")
zstat_name <- system.file("extdata", "zstat.nii.gz", package="ARIBrain")
mask_name <- system.file("extdata", "mask.nii.gz", package="ARIBrain")

print(mask_name)
print(pvalue_name)
print(cluster_name)
print(zstat_name)

ARI(Pmap = pvalue_name, clusters= cluster_name,
    mask=mask_name, Statmap = zstat_name)
```

---

|                   |                          |
|-------------------|--------------------------|
| cluster_threshold | <i>cluster_threshold</i> |
|-------------------|--------------------------|

---

### Description

Get spatially-connected clusters starting from a 3D map of logical values

### Usage

```
cluster_threshold(map, max_dist = sqrt(3))
```

### Arguments

|          |                                                                                                                                                                                                                   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| map      | 3D map of logical values. TRUE if the voxel it to be clustered (e.g. it is supra-threshold).                                                                                                                      |
| max_dist | maximum distance allowed to in the same cluster. By default: max_dist=sqrt(3) i.e. comprises all the voxels up to the corners souranding the target voxel. A value such as max_dist=sqrt(2) excludes the corners. |

**Value**

a 3D map (same size of map) with integer values identifying the cluster and 0 elsewhere.

**Examples**

```
## Not run:  
Tmap = RNifti::readNifti(system.file("extdata", "zstat.nii.gz", package="ARIBrain"))  
clstr=cluster_threshold(Tmap>3.2)  
table(clstr)  
  
## End(Not run)
```

# Index

ARI, [2](#)

ARIBrain-package, [2](#)

cluster\_threshold, [3](#)