

# Package ‘spikes’

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**Type** Package

**Title** Detecting Election Fraud from Irregularities in Vote-Share Distributions

**Version** 1.1

**Depends** R (>= 3.2.2), emdbook

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**Description** Applies re-sampled kernel density method to detect vote fraud. It estimates the proportion of coarse vote-shares in the observed data relative to the null hypothesis of no fraud.

**License** GPL (>= 2)

**NeedsCompilation** no

**Repository** CRAN

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confInt	<i>Credible interval</i>
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**Description**

Estimates credible interval by (1) taking a draw from the posterior density (2) implementing the RKD step. The procedure is repeated boot times.

**Usage**

```
confInt(object, boots = 100)
```

**Arguments**

object	object of class out returned by spikes
boots	number of samples from the posterior; default 100

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data	<i>Example data</i>
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**Description**

Synthetic dataset

**Usage**

```
data("data")
```

**Format**

Precinct-level election data from the 2011 Canadian parliamentary elections..

N number of registered voters

t turnout

v votes for the Conservative party

**Examples**

```
data(data)
```

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output	<i>Output object</i>
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**Description**

An object of class out returned by spikes or confint.out.

**Usage**

```
data("output")
```

**Examples**

```
data(output)
plot(output)
```

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plot.out	<i>Plots output of spikes</i>
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**Description**

Plots the observed kernel density of data and the upper envelope of the resampled densities.

**Usage**

```
## S3 method for class 'out'
plot(x, main = NULL, ...)
```

**Arguments**

x	Object of class out
main	Title, NULL by default
...	additional plotting arguments

**Examples**

```
data(output)
plot(output)
```

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spikes *Fraud-detection from vote-share data*

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### Description

Implements the resampled kernel density method to detect the excess number of election results with coarse vote-shares (a coarse vote-share is a fraction with a low denominator).

### Usage

```
spikes(data, resamples = 1000, bw = 1e-04, grid = 1001, out = NULL)
```

### Arguments

data	Data frame with three columns with names $N$ (number of votes), $t$ (number who turned out to vote), and $v$ (number who voted for the party the votes of which are being analyzed). Returns error if columns are named incorrectly.
resamples	Number of resamples; default 1000
bw	Bandwidth for kernel density; default 0.0001
grid	Number of points on which the density is estimated; default 1001
out	Object containing parameters of beta-mixture model. If spikes has been called earlier, then out = output\$out will skip density estimation and proceed directly to resampling.

### Value

spikes returns object of class out.

fraud	Estimated percentage of polling stations with fraud.
ymax	Upper envelope of kernel density samples.
w	Weights for each bin: the proportion of observations falling into a bin.
out	Maximum likelihood estimates of the mixture beta binomial parameters for turnout and votes.
data	Data used in estimation.

### See Also

See Also [plot.out](#), [summary.out](#)

### Examples

```
data(data)
## Not run:
out <- spikes(data, resamples = 1000)

## End(Not run)
```

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spikes-internal	<i>Internal functions</i>
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**Description**

Internal functions, should not be called by user

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summary.out	<i>Summarize</i>
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**Description**

Extracts estimate of fraud and 95 percent credible interval (if such is estimated) for the object of class out returned by spikes or confint.out.

**Usage**

```
## S3 method for class 'out'  
summary(object, ...)
```

**Arguments**

object	Object of class out
...	additional arguments

**Note**

If the argument is from spikes, then summary returns degenerate credible interval, as it was not estimated. To return a proper credible interval, confint.out must take as its argument object returned by confint.out.

**Examples**

```
data(output)  
summary(output)
```

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