

Package ‘RVenn’

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Type Package

Title Set Operations for Many Sets

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Description Set operations for many sets. The base functions for set operations in R are good for only two sets. This package uses 'purrr' to find the union, intersection and difference of three or more sets. Further, based on 'ggplot2' and 'ggforce', Venn diagram can be drawn for two or three sets (Venn diagrams with four or more sets are terrible, please use 'UpSet' if you have lots of sets). Finally, enrichment test can be applied to two sets whether an overlap is statistically significant or not.

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Encoding UTF-8

LazyData true

Imports ggforce (>= 0.2.1), ggplot2 (>= 3.0.0), magrittr (>= 1.5), purrr (>= 0.2.5), methods (>= 3.5.1), rlang (>= 0.2.2)

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construct, ANY-method *Build a Venn object*

Description

construct builds a Venn object from a list.

Usage

```
## S4 method for signature 'ANY'
construct(sets)
```

Arguments

sets (Required) A list containing vectors in the same type. If a vector contains duplicates, they will be discarded. If the list doesn't have names, the sets will be named as "Set_1", "Set_2", "Set_3" and so on.

Value

A Venn object.

Examples

```
venn = construct(list(letters[1:10], letters[3:12], letters[6:15]))
print(venn)
```

discern, Venn-method *Set difference*

Description

discern returns the difference between two group of sets selected from a Venn object.

Usage

```
## S4 method for signature 'Venn'  
discern(venn, slice1, slice2 = "all")
```

Arguments

venn (Required) A Venn object.
slice1 (Required) A character or numeric vector to pick sets.
slice2 (Optional) A character or numeric vector to pick sets.

Value

A character or numeric vector showing *slice1* – *slice2*.

Examples

```
venn = construct(list(letters[1:10], letters[3:12], letters[6:15]))  
discern(venn, slice1 = 1)  
discern(venn, slice1 = c(1, 2), slice2 = 3)
```

enrichment_test *Perform an enrichment test*

Description

Calculate the p-value of occurrence of an overlap between two sets by chance.

Usage

```
## S4 method for signature 'Venn'  
enrichment_test(venn, set1, set2, univ = "all",  
                n = 10000, seed = 42)
```

Arguments

venn	(Required) A Venn object.
set1	(Required) A character or integer vector to pick a set of interest
set2	(Required) A character or integer vector to pick the set to be checked whether enriched in set1 to be checked if it is enriched in set1)
univ	(Optional) Population size. Default is "all", implying the union of all the sets in the Venn object will be used. Another set as the whole population can be assigned as well.
n	(Optional) Number of randomly generated sets. Default is 10000.
seed	(Optional) A single integer passed to set.seed function. It is used to fix a seed for reproducibly random number generation. Default is 42.

Details

This type of analysis can also be performed by hypergeometric test or Fisher's exact test. Here, the approach is similar to that described in (Austin et al., 2016). Briefly, the test is based on randomly generating sets with equal size to set1 from the background (universal) set. After creating n (default is 10000) random sets, the overlap between these and set2 is calculated to create a null distribution. When this distribution is true, the probability of seeing an overlap at least as extreme as what was observed (overlap between set1 and set2) will be returned as the p-value.

Value

Returns a list containing the p-value (Significance) of occurrence of an overlap between two sets by chance and the number of occurrences (Overlap_Counts) in randomly generated sets.

Examples

```
set1 = c(1:20, letters[1:10])
set2 = letters[-26]
univ = unique(c(set1, set2, 21:200))
venn = construct(list(set1, set2, univ))
e = enrichment_test(venn, 1, 2)
e$Significance
```

ggvenn, Venn-method *Draw the Venn diagram*

Description

Draw the Venn diagram for 2 or 3 sets

Usage

```
## S4 method for signature 'Venn'
ggvenn(venn = "Venn", slice = "all",
       fill = c("gold", "dodgerblue3", "deeppink"), alpha = 0.5,
       thickness = 1.5)
```

Arguments

venn	(Required) A Venn object.
slice	(Optional) A character or numeric vector to pick 2 or 3 sets. Default is "all", which is for the cases the Venn object only contains 2 or 3 sets. If you have 4 or more sets, this argument is required.
fill	(Optional) Fill color of the sets.
alpha	(Optional) Opacity of the fill colors. Default is 0.5 in the range of (0, 1).
thickness	(Optional) Stroke size of the sets.

Details

This function is based on the packages `ggplot` and `ggforce`. It has been designed for 2 or 3 sets because Venn diagrams are terrible for showing the interactions of 4 or more sets. If you need to visualize such interactions, consider using [UpSet](#).

Value

The function returns the plot in `ggplot2` style.

Examples

```
venn = construct(list(letters[1:10], letters[3:12], letters[6:15]))
ggvenn(venn)
ggvenn(venn, slice = c(1, 2), thickness = 0, alpha = 0.3)
```

overlap, Venn-method *Intersection of many sets*

Description

`overlap` returns the same elements of the sets in a Venn object.

Usage

```
## S4 method for signature 'Venn'
overlap(venn, slice = "all")
```

Arguments

venn	(Required) A Venn object.
slice	(Optional) A character or numeric vector to pick sets. Default is "all", meaning the intersection will be calculated for all the sets.

Value

A character or numeric vector showing the union of the sets.

Examples

```
venn = construct(list(letters[1:10], letters[3:12], letters[6:15]))
overlap(venn)
overlap(venn, slice = c(1, 2))
```

RVenn	<i>RVenn: A package for set operations for three or more sets.</i>
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Description

The RVenn package provides functions for application of set operations on multiple sets. It also performs hypergeometric test and plots the Venn diagram for 2-3 sets by using ggplot2 and ggforce packages.

unite, Venn-method	<i>Union of many sets</i>
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Description

unite returns the union of the sets in a Venn object.

Usage

```
## S4 method for signature 'Venn'
unite(venn, slice = "all")
```

Arguments

venn	(Required) A Venn object.
slice	(Optional) A character or numeric vector to pick sets. Default is "all", meaning the union will be calculated for all the sets.

Value

A character or numeric vector showing the union of the sets.

Examples

```
venn = construct(list(letters[1:10], letters[3:12], letters[6:15]))
unite(venn)
unite(venn, slice = c(1, 2))
```

Venn-class	<i>An S4 class to represent multiple sets.</i>
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Description

An S4 class to represent multiple sets.

Slots

sets A list object containing vectors in the same type.

names The names of the sets if it has names. If the list doesn't have names, the sets will be named as "Set_1", "Set_2", "Set_3" and so on.

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