

Package ‘ahnr’

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Type Package

Title An Implementation of the Artificial Hydrocarbon Networks

Version 0.1.0

Description Implementation of the Artificial Hydrocarbon Networks for data modeling.

Depends R (>= 3.3.0)

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Encoding UTF-8

LazyData true

Suggests knitr, rmarkdown

URL <https://github.com/jroberayalas/ahnr>

BugReports <https://github.com/jroberayalas/ahnr/issues>

VignetteBuilder knitr

Imports matrixcalc, pracma, purrr, pdist, ggplot2, visNetwork, magrittr

RoxygenNote 6.0.1

NeedsCompilation no

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Repository CRAN

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AHNnD

AHNnD

Description

Function to train an Artificial Hydrocarbon Network (AHN).

Usage

```
AHNnD(Sigma, n, eta, maxIter = 2000)
```

Arguments

Sigma	a list with two data frames. One for the inputs X, and one for the outputs Y.
n	number of particles to use.
eta	learning rate of the algorithm. Default is 0.01.
maxIter	maximum number of iterations.

Value

an object of class "ahn" with the following components:

- network: structure of the AHN trained.
- Yo: original output variable.
- Ym: predicted output variable.
- eta: learning rate.
- minOverallError: minimum error achieved.
- variableNames: names of the input variables.

Examples

```
# Create data
x <- 2 * runif(1000) - 1;
x <- sort(x)

y <- (x < 0.1) * (0.05 * runif(100) + atan(pi*x)) +
(x >= 0.1 & x < 0.6) * (0.05 * runif(1000) + sin(pi*x)) +
(x >= 0.6) * (0.05 * runif(1000) + cos(pi*x))

# Create Sigma list
Sigma <- list(X = data.frame(x = x), Y = data.frame(y = y))

# Train AHN
ahn <- AHNnD(Sigma, 5, 0.01, 500)
```

```

plot.ahn      #' plotAHN #' #' @param ahn a list produced from the AHNnD
              function. #' #' @return visualization of the AHN. #' @export #' #'
              @examples #' #' Create data #' x <- 2 * runif(1000) - 1; #' x <- sort(x)
              #' #' y <- (x < 0.1) * (0.05 * runif(100) + atan(pi*x)) + #' (x >= 0.1
              & x < 0.6) * (0.05 * runif(1000) + sin(pi*x)) + #' (x >= 0.6) * (0.05
              * runif(1000) + cos(pi*x)) #' #' # Create Sigma list #' Sigma <- list(X
              = data.frame(x = x), Y = data.frame(y = y)) #' #' # Train AHN #' ahn
              <- AHNnD(Sigma, 5, 0.01, 500) #' #' # Plot AHN #' plotAHN(ahn)
              #' plotAHN <- function(ahn) vis <- CreateNodesEdges(ahn)
              graph <- igrph::graph_from_data_frame(vis$edges, directed =
              FALSE, vertices = vis$nodes) ggraph(graph, layout = 'graphopt')
              + geom_edge_link(aes(start_cap = label_rect(node1.name),
              end_cap = label_rect(node2.name))) + geom_node_text(label
              = vis$nodes$label) + theme_void() Plot Artificial Hydrocarbon
              Network

```

Description

Plot method for objects of class ahn.

Usage

```
## S3 method for class 'ahn'
plot(x, ...)
```

Arguments

x an object of class "ahn" produced from the [AHNnD](#) function.
 ... further arguments passed to visNetwork functions.

Value

dynamic visualization of the AHN.

Examples

```

# Create data
x <- 2 * runif(1000) - 1;
x <- sort(x)

y <- (x < 0.1) * (0.05 * runif(100) + atan(pi*x)) +
  (x >= 0.1 & x < 0.6) * (0.05 * runif(1000) + sin(pi*x)) +
  (x >= 0.6) * (0.05 * runif(1000) + cos(pi*x))

# Create Sigma list
Sigma <- list(X = data.frame(x = x), Y = data.frame(y = y))

```

```
# Train AHN
ahn <- AHNnD(Sigma, 5, 0.01, 500)

# Plot AHN
plot(ahn)
```

 SimAHNnD

SimAHNnD

Description

Function to simulate a trained Artificial Hydrocarbon Network.

Usage

```
SimAHNnD(ahn, X)
```

Arguments

ahn an object of class "ahn" produced from the [AHNnD](#) function.
X data frame with the inputs X to be predicted.

Value

predicted output values for inputs X.

Examples

```
# Create data
x <- 2 * runif(1000) - 1;
x <- sort(x)

y <- (x < 0.1) * (0.05 * runif(100) + atan(pi*x)) +
  (x >= 0.1 & x < 0.6) * (0.05 * runif(1000) + sin(pi*x)) +
  (x >= 0.6) * (0.05 * runif(1000) + cos(pi*x))

# Create Sigma list
Sigma <- list(X = data.frame(x = x), Y = data.frame(y = y))

# Train AHN
ahn <- AHNnD(Sigma, 5, 0.01, 500)

# Test AHN
X <- data.frame(x = x)
ysim <- SimAHNnD(ahn, X)
```

`summary.ahn`*Summary Artificial Hydrocarbon Network*

Description

Summary method for objects of class `ahn`.

Usage

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

Arguments

`object` an object of class "ahn" produced from the [AHNnD](#) function.
`...` further arguments passed to or from other methods.

Value

summary description of the AHN.

Examples

```
# Create data  
x <- 2 * runif(1000) - 1;  
x <- sort(x)  
  
y <- (x < 0.1) * (0.05 * runif(100) + atan(pi*x)) +  
      (x >= 0.1 & x < 0.6) * (0.05 * runif(1000) + sin(pi*x)) +  
      (x >= 0.6) * (0.05 * runif(1000) + cos(pi*x))  
  
# Create Sigma list  
Sigma <- list(X = data.frame(x = x), Y = data.frame(y = y))  
  
# Train AHN  
ahn <- AHNnD(Sigma, 5, 0.01, 500)  
  
# Summary AHN  
summary(ahn)
```

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