Package ‘fuzzyforest’

October 27, 2019

Title Fuzzy Forests

Version 1.0.6

Description Fuzzy forests, a new algorithm based on random forests, is designed to reduce the bias seen in random forest feature selection caused by the presence of correlated features. Fuzzy forests uses recursive feature elimination random forests to select features from separate blocks of correlated features where the correlation within each block of features is high and the correlation between blocks of features is low. One final random forest is fit using the surviving features. This package fits random forests using the 'randomForest' package and allows for easy use of 'WGCNA' to split features into distinct blocks. See D. Conn, Ngun, T., C. Ramirez, and G. Li (2019) <doi:10.18637/jss.v091.i09> for further details.

Depends R (>= 3.2.1)
License GPL-3
LazyData true
Imports randomForest, foreach, doRNG, doParallel, parallel, ggplot2, mvtnorm
Suggests WGCNA, testthat
RoxygenNote 6.1.1
NeedsCompilation no
Author Daniel Conn [aut, cre], Tuck Ngun [aut], Christina M. Ramirez [aut]
Maintainer Daniel Conn <djconn17@gmail.com>
Repository CRAN
Date/Publication 2019-10-26 22:40:03 UTC

R topics documented:

c tg . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
### Description

A data set containing measurements of fetal heart rate and uterine contraction from cardiotocograms. This data set was obtained from the [UCI machine learning repository](https://archive.ics.uci.edu/ml/index.html).

For our examples we extract a random sub sample of 100 observations.

### Usage

```r
data(ctg)
```

### Format

A data frame with 100 rows and 21.

---

### example_ff

#### Fuzzy Forest Example

An example of a fuzzy_forest object derived from fitting fuzzy forests on the ctg data set. The source code used to produce example_ff can be seen in the vignette "fuzzyforest_introduction".

### Format

`.RData`
Fuzzy forests algorithm

Description

Fits the fuzzy forests algorithm. Note that a formula interface for fuzzy forests also exists: \texttt{ff.formula}.

Usage

```r
## Default S3 method:
ff(X, y, Z = NULL, module_membership,
   screen_params = screen_control(min_ntree = 500),
   select_params = select_control(min_ntree = 500), final_ntree = 5000,
   num_processors = 1, nodesize, test_features = NULL, test_y = NULL,
   ...)
ff(X, ...)
```

Arguments

- **X**: A data.frame. Each column corresponds to a feature vectors.
- **y**: Response vector. For classification, y should be a factor. For regression, y should be numeric.
- **Z**: A data.frame. Additional features that are not to be screened out at the screening step.
- **module_membership**: A character vector giving the module membership of each feature.
- **screen_params**: Parameters for screening step of fuzzy forests. See \texttt{screen_control} for details. screen_params is an object of type \texttt{screen_control}.
- **select_params**: Parameters for selection step of fuzzy forests. See \texttt{select_control} for details. select_params is an object of type \texttt{select_control}.
- **final_ntree**: Number of trees grown in the final random forest. This random forest contains all selected features.
- **num_processors**: Number of processors used to fit random forests.
- **nodesize**: Minimum terminal nodesize. 1 if classification. 5 if regression. If the sample size is very large, the trees will be grown extremely deep. This may lead to issues with memory usage and may lead to significant increases in the time it takes the algorithm to run. In this case, it may be useful to increase nodesize.
- **test_features**: A data.frame containing features from a test set. The data.frame should contain the features in both X and Z.
- **test_y**: The responses for the test set.
- **...**: Additional arguments currently not used.
Value

An object of type `fuzzy_forest`. This object is a list containing useful output of fuzzy forests. In particular it contains a data frame with a list of selected the features. It also includes a random forest fit using the selected features.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

References


See Also

`ff.formula`, `print.fuzzy_forest`, `predict.fuzzy_forest`, `modplot`

Examples

```r
#ff requires that the partition of the covariates be previously determined.
#ff is also handy if the user wants to test out multiple settings of WGCNA
#prior to running fuzzy forests.

library(mvtnorm)

gen_mod <- function(n, p, corr) {
  sigma <- matrix(corr, nrow=p, ncol=p)
  diag(sigma) <- 1
  X <- rmvnorm(n, sigma=sigma)
  return(X)
}

gen_X <- function(n, mod_sizes, corr){
  m <- length(mod_sizes)
  X_list <- vector("list", length = m)
  for(i in 1:m){
    X_list[[i]] <- gen_mod(n, mod_sizes[i], corr[i])
  }
  X <- do.call("cbind", X_list)
  return(X)
}

err_sd <- .5
n <- 500
mod_sizes <- rep(25, 4)
```
```r
corr <- rep(.8, 4)
X <- gen_X(n, mod_sizes, corr)
beta <- rep(0, 100)
beta[c(1:4, 76:79)] <- 5
y <- X%*%beta + rnorm(n, sd=err_sd)
X <- as.data.frame(X)

Xtest <- gen_X(n, mod_sizes, corr)
ytest <- Xtest%*%beta + rnorm(n, sd=err_sd)
Xtest <- as.data.frame(Xtest)

cdist <- as.dist(1 - cor(X))
hclust_fit <- hclust(cdist, method="ward.D")
groups <- cutree(hclust_fit, k=4)

screen_c <- screen_control(keep_fraction = .25,
                         ntree_factor = 1,
                         min_ntree = 250)
select_c <- select_control(number_selected = 10,
                           ntree_factor = 1,
                           min_ntree = 250)

ff_fit <- ff(X, y, module_membership = groups,
             screen_params = screen_c,
             select_params = select_c,
             final_ntree = 250)
#extract variable importance rankings
vims <- ff_fit$feature_list

#plot results
modplot(ff_fit)

#obtain predicted values for a new test set
preds <- predict(ff_fit, new_data=Xtest)

#estimate test set error
test_err <- sqrt(sum((ytest - preds)^2)/n)
```

---

### ff.formula

**Fuzzy forests algorithm**

**Description**

Implements formula interface for `ff`.

**Usage**

```r
## S3 method for class 'formula'
ff(formula, data = NULL, module_membership, ...)
```
Arguments

- formula: Formula object.
- data: data used in the analysis.
- module_membership: A character vector giving the module membership of each feature.
- ... Additional arguments

Value

An object of type fuzzy_forest. This object is a list containing useful output of fuzzy forests. In particular it contains a data.frame with list of selected features. It also includes the random forest fit using the selected features.

Note

See ff for additional arguments. Note that the matrix, Z, of features that do not go through the screening step must specified separately from the formula. test_features and test_y are not supported in formula interface. As in the randomForest package, for large data sets the formula interface may be substantially slower.

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

References


See Also

- ff, print.fuzzy_forest, predict.fuzzy_forest, modplot

Examples

```r
#ff requires that the partition of the covariates be previously determined.
#ff is also handy if the user wants to test out multiple settings of WGCNA
#prior to running fuzzy forests.
library(mvtnorm)
gen_mod <- function(n, p, corr) {
  sigma <- matrix(corr, nrow=p, ncol=p)
  diag(sigma) <- 1
  X <- rmvnorm(n, sigma=sigma)
  return(X)
}
```
gen_X <- function(n, mod_sizes, corr){
  m <- length(mod_sizes)
  X_list <- vector("list", length = m)
  for(i in 1:m){
    X_list[[i]] <- gen_mod(n, mod_sizes[i], corr[i])
  }
  X <- do.call("cbind", X_list)
  return(X)
}

err_sd <- .5
n <- 500
mod_sizes <- rep(25, 4)
corr <- rep(.8, 4)
X <- gen_X(n, mod_sizes, corr)
beta <- rep(0, 100)
beta[c(1:4, 76:79)] <- 5
y <- X%*%beta + rnorm(n, sd=err_sd)
X <- as.data.frame(X)
dat <- as.data.frame(cbind(y, X))

Xtest <- gen_X(n, mod_sizes, corr)
ytest <- Xtest%*%beta + rnorm(n, sd=err_sd)
Xtest <- as.data.frame(Xtest)

cdist <- as.dist(1 - cor(X))
hclust_fit <- hclust(cdist, method="ward.D")
groups <- cutree(hclust_fit, k=4)

screen_c <- screen_control(keep_fraction = .25,
                          ntree_factor = 1,
                          min_ntree = 250)
select_c <- select_control(number_selected = 10,
                           ntree_factor = 1,
                           min_ntree = 250)

ff_fit <- ff(y ~ ., data=dat,
             module_membership = groups,
             screen_params = screen_c,
             select_params = select_c,
             final_ntree = 250)
#extract variable importance rankings
vims <- ff_fit$feature_list
#plot results
modplot(ff_fit)

#obtain predicted values for a new test set
preds <- predict(ff_fit, new_data=Xtest)
#estimate test set error
test_err <- sqrt(sum((ytest - preds)^2)/n)
fuzzyforest: an implementation of the fuzzy forest algorithm in R.

Description
This package implements fuzzy forests and integrates the fuzzy forests algorithm with the package, WGCNA.

Note
This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

fuzzy_forest
Fuzzy Forest Object

Description
Fuzzy forests returns an object of type fuzzyforest.

Usage
fuzzy_forest(feature_list, final_rf, module_membership, WGCNA_object = NULL, survivor_list, selection_list)

Arguments
feature_list List of selected features along with variable importance measures.
final_rf A final random forest fit using the features selected by fuzzy forests.
module_membership Module membership of each feature.
WGCNA_object If applicable, output of WGCNA analysis.
survivor_list List of features that have survived screening step.
selection_list List of features retained at each iteration of selection step.

Value
An object of type fuzzy_forest.

Note
This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.
iterative_RF

Fits iterative random forest algorithm.

Description

Fits iterative random forest algorithm. Returns data.frame with variable importances and top rated features. For now this is an internal function that I’ve used to explore how recursive feature elimination works in simulations. It may be exported at a later time.

Usage

iterative_RF(X, y, drop_fraction, keep_fraction, mtry_factor, ntree_factor = 10, min_ntree = 5000, num_processors = 1, nodesize)

Arguments

- **X**: A data.frame. Each column corresponds to a feature vectors.
- **y**: Response vector.
- **drop_fraction**: A number between 0 and 1. Percentage of features dropped at each iteration.
- **keep_fraction**: A number between 0 and 1. Proportion features from each module to retain at screening step.
- **mtry_factor**: A positive number. Mtry for each random forest is set to ceiling(√p mtry_factor) where p is the current number of features.
- **ntree_factor**: A number greater than 1. ntree for each random is ntree_factor times the number of features. For each random forest, ntree is set to max(min_ntree, ntree_factor*p).
- **min_ntree**: Minimum number of trees grown in each random forest.
- **num_processors**: Number of processors used to fit random forests.
- **nodesize**: Minimum nodesize.

Value

A data.frame with the top ranked features.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.
Liver_Expr  Liver Expression Data from Female Mice

Description

A data set containing gene expression levels in liver tissue from female mice. This data set is a subset of the liver expression data set from the WGCNA tutorial https://horvath.genetics.ucla.edu/html/CoexpressionNetwork/Rpackages/WGCNA/Tutorials/. The tutorial contains further information about the data set as well as extensive examples of WGCNA.

Usage

data(Liver_Expr)

Format

A data frame with 66 rows and 3601

Details

• The first column contains weight (g) for the 66 mice.
• The other 3600 columns contain the liver expression levels.

modplot  Plots relative importance of modules.

Description

The plot is designed to depict the size of each module and what percentage of selected features fall into each module. In particular, it is easy to determine which module is over-represented in the group of selected features.

Usage

modplot(object, main = NULL, xlab = NULL, ylab = NULL, module_labels = NULL)

Arguments

object  A fuzzy_forest object.
main  Title of plot.
xlab  Title for the x axis.
ylab  Title for the y axis.
module_labels  Labels for the modules. A data.frame or character matrix with first column giving the current name of module and second column giving the assigned name of each module.
## multi_class_lr

### Multinomial Logistic Regression

**Description**

Function to generate multi-class data from a multinomial logistic regression. Assumes there are 5 classes. Only supports two modules for now. Currently this function is used for testing.

**Usage**

```r
multi_class_lr(n, mod1_size = 10, mod2_size = 10, rho = 0.8, beta = NULL)
```

**Arguments**

- `n` Sample size.
- `mod1_size` Size of first module.
- `mod2_size` Size of second module.
- `rho` Correlation of covariates.
- `beta` A matrix of parameters.

**Value**

list with design matrix X, outcome y, and beta.

**Note**

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

---

**See Also**

`ff, wff, ff.formula, wff.formula`

---

**Note**

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.
predict.fuzzy_forest  

Predict method for fuzzy_forest object. Obtains predictions from fuzzy forest algorithm.

Description

Predict method for fuzzy_forest object. Obtains predictions from fuzzy forest algorithm.

Usage

```r
## S3 method for class 'fuzzy_forest'
predict(object, new_data, ...)
```

Arguments

- `object`: A fuzzy_forest object.
- `new_data`: A matrix or data.frame containing new_data. Pay close attention to ensure feature names match between training set and test set data.frame.
- `...`: Additional arguments not in use.

Value

A vector of predictions

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

See Also

`ff`, `wff`, `ff.formula`, `wff.formula`

Examples

```r
library(mvtnorm)
gen_mod <- function(n, p, corr) {
  sigma <- matrix(corr, nrow=p, ncol=p)
  diag(sigma) <- 1
  X <- rmvnorm(n, sigma=sigma)
  return(X)
}

gen_X <- function(n, mod_sizes, corr){
m <- length(mod_sizes)
X_list <- vector("list", length = m)
for(i in 1:m){
  X_list[[i]] <- gen_mod(n, mod_sizes[i], corr[i])
}
```
```r
X <- do.call("cbind", X_list)
return(X)
}

err_sd <- .5
n <- 500
mod_sizes <- rep(25, 4)
corr <- rep(.8, 4)
X <- gen_X(n, mod_sizes, corr)
beta <- rep(0, 100)
beta[c(1:4, 76:79)] <- 5
y <- X%*%beta + rnorm(n, sd=err_sd)
X <- as.data.frame(X)

Xtest <- gen_X(n, mod_sizes, corr)
ytest <- Xtest%*%beta + rnorm(n, sd=err_sd)
Xtest <- as.data.frame(Xtest)

cdist <- as.dist(1 - cor(X))
hclust_fit <- hclust(cdist, method="ward.D")
groups <- cutree(hclust_fit, k=4)

screen_c <- screen_control(keep_fraction = .25,
ntree_factor = 1,
min_ntree = 250)
select_c <- select_control(number_selected = 10,
ntree_factor = 1,
min_ntree = 250)

ff_fit <- ff(X, y, module_membership = groups,
screen_params = screen_c,
select_params = select_c,
final_ntree = 250)
#extract variable importance rankings
vims <- ff_fit$feature_list

#plot results
modplot(ff_fit)

#obtain predicted values for a new test set
preds <- predict(ff_fit, new_data=Xtest)

#estimate test set error
test_err <- sqrt(sum((ytest - preds)^2)/n)
```

**print.fuzzy_forest**

Print fuzzy_forest object. Prints output from fuzzy forests algorithm.

**Description**

Print fuzzy_forest object. Prints output from fuzzy forests algorithm.
screen_control

Usage

## S3 method for class 'fuzzy_forest'
print(x, ...)

Arguments

x A fuzzy_forest object.
...

Value

data.frame with list of selected features and variable importance measures.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

screen_control Set Parameters for Screening Step of Fuzzy Forests

Description

Creates screen_control object for controlling how feature selection will be carried out on each module.

Usage

screen_control(drop_fraction = 0.25, keep_fraction = 0.05, mtry_factor = 1, min_ntree = 500, ntree_factor = 1)

Arguments

drop_fraction A number between 0 and 1. Percentage of features dropped at each iteration.
keep_fraction A number between 0 and 1. Proportion of features from each module that are retained from screening step.
mtry_factor In the case of regression, mtry is set to ceiling(\(\sqrt{p}\)*mtry_factor). In the case of classification, mtry is set to ceiling((p/3)*mtry_factor). If either of these numbers is greater than p, mtry is set to p.
min_ntree Minimum number of trees grown in each random forest.
ntree_factor A number greater than 1. ntree for each random forest is ntree_factor times the number of features. For each random forest, ntree is set to max(min_ntree, ntree_factor*p).

Value

An object of type screen_control.
Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

References


Examples

```r
drop_fraction <- .25
keep_fraction <- .1
mtry_factor <- 1
min_ntree <- 5000
ntree_factor <- 5
screen_params <- screen_control(drop_fraction=drop_fraction,
                                 keep_fraction=keep_fraction,
                                 mtry_factor=mtry_factor,
                                 min_ntree=min_ntree,
                                 ntree_factor=ntree_factor)
```

---

**select_control**

*Set Parameters for Selection Step of Fuzzy Forests*

**Description**

Creates `selection_control` object for controlling how feature selection will be carried out after features from different modules have been combined.

**Usage**

```r
select_control(drop_fraction = 0.25, number_selected = 5,
               mtry_factor = 1, min_ntree = 500, ntree_factor = 1)
```

**Arguments**

- `drop_fraction` A number between 0 and 1. Percentage of features dropped at each iteration.
- `number_selected` A positive number. Number of features that will be selected by fuzzyforests.
- `mtry_factor` In the case of regression, `mtry` is set to `ceiling(\sqrt(p)\times mtry_factor)`. In the case of classification, `mtry` is set to `ceiling((p/3)\times mtry_factor)`. If either of these numbers is greater than `p`, `mtry` is set to `p`.
- `min_ntree` Minimum number of trees grown in each random forest.
- `ntree_factor` A number greater than 1. `ntree` for each random forest is `ntree_factor` times the number of features. For each random forest, `ntree` is set to `max(min_ntree, ntree_factor\times p)`.
Value

An object of type selection_control.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

References


Examples

drop_fraction <- .25
count_selected <- 10
mtry_factor <- 1
min_ntree <- 5000
ntree_factor <- 5
select_params <- select_control(drop_fraction=drop_fraction,
count_selected=count_selected,
mtry_factor=mtry_factor,
min_ntree=min_ntree,
nntree_factor=ntree_factor)

```
select_RF(X, y, drop_fraction, number_selected, mtry_factor, ntree_factor,
           min_ntree, num_processors, nodesize)
```

Description

Carries out the selection step of fuzzyforest algorithm. Returns data.frame with variable importances and top rated features.

Usage

select_RF(X, y, drop_fraction, number_selected, mtry_factor, ntree_factor,
           min_ntree, num_processors, nodesize)

Arguments

- **X**: A data.frame. Each column corresponds to a feature vectors. Could include additional covariates not a part of the original modules.
- **y**: Response vector.
- **drop_fraction**: A number between 0 and 1. Percentage of features dropped at each iteration.
- **number_selected**: Number of features selected by fuzzyforest.
In the case of regression, mtry is set to ceiling(√(p) * mtry_factor). In the case of classification, mtry is set to ceiling((p/3) * mtry_factor). If either of these numbers is greater than p, mtry is set to p.

ntree_factor: A number greater than 1. ntree for each random is ntree_factor times the number of features. For each random forest, ntree is set to max(min_ntree, ntree_factor * p).

min_ntree: Minimum number of trees grown in each random forest.

num_processors: Number of processors used to fit random forests.

nodesize: Minimum nodesize

Value

A data.frame with the top ranked features.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

Description

Fits fuzzy forests using WGCNA to cluster features into distinct modules. Requires installation of WGCNA package. Note that a formula interface for WGCNA based fuzzy forests also exists: wff.formula.

Usage

```r
# Default S3 method:
wff(X, y, Z = NULL,
    WGCNA_params = WGCNA_control(power = 6),
    screen_params = screen_control(min_ntree = 500),
    select_params = select_control(min_ntree = 500), final_ntree = 5000,
    num_processors = 1, nodesize, test_features = NULL, test_y = NULL,
    ...)
```

Arguments

- `X`: A data.frame. Each column corresponds to a feature vector. WGCNA will be used to cluster the features in X. As a result, the features should be all be numeric. Non-numeric features may be input via Z.
- `y`: Response vector. For classification, y should be a factor. For regression, y should be numeric.
Z  Additional features that are not to be screened out at the screening step. WGCNA is not carried out on features in Z.

WGCNA_params  Parameters for WGCNA. See blockwiseModules function from WGCNA and WGCNA_control for details. WGCNA_params is an object of type WGCNA_control.

screen_params  Parameters for screening step of fuzzy forests. See screen_control for details. screen_params is an object of type screen_control.

select_params  Parameters for selection step of fuzzy forests. See select_control for details. select_params is an object of type select_control.

final_ntree  Number of trees grown in the final random forest. This random forest contains all selected features.

num_processors  Number of processors used to fit random forests.

nodesize  Minimum terminal nodesize. 1 if classification. 5 if regression. If the sample size is very large, the trees will be grown extremely deep. This may lead to issues with memory usage and may lead to significant increases in the time it takes the algorithm to run. In this case, it may be useful to increase nodesize.

test_features  A data.frame containing features from a test set. The data.frame should contain the features in both X and Z.

test_y  The responses for the test set.

...  Additional arguments currently not used.

Value

An object of type fuzzy_forest. This object is a list containing useful output of fuzzy forests. In particular it contains a data.frame with list of selected features. It also includes the random forest fit using the selected features.

Note

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

References


See Also

wff.formula, print.fuzzy_forest, predict.fuzzy_forest, modplot
Examples

data(ctg)
y <- ctg$NSP
X <- ctg[, 2:22]
WGCNA_params <- WGCNA_control(p = 6, minModuleSize = 1, nThreads = 1)
mtry_factor <- 1; min_ntree <- 500; drop_fraction <- .5; ntree_factor <- 1
screen_params <- screen_control(drop_fraction = drop_fraction,
    keep_fraction = .25, min_ntree = min_ntree,
    ntree_factor = ntree_factor,
    mtry_factor = mtry_factor)
sel_params <- select_control(drop_fraction = drop_fraction,
    number_selected = 5,
    min_ntree = min_ntree,
    ntree_factor = ntree_factor,
    mtry_factor = mtry_factor)
wff_fit <- wff(X, y, WGCNA_params = WGCNA_params,
    screen_params = screen_params,
    select_params = select_params,
    final_ntree = 500)

#extract variable importance rankings
vims <- wff_fit$feature_list

#plot results
modplot(wff_fit)

---

wff.formula  

WGCNA based fuzzy forest algorithm

Description

Implements formula interface for wff.

Usage

## S3 method for class 'formula'
wff(formula, data = NULL, ...)

Arguments

formula  
Formula object.
data  
data used in the analysis.
...  
Additional arguments
Value

An object of type `fuzzy_forest`. This object is a list containing useful output of fuzzy forests. In particular it contains a data.frame with list of selected features. It also includes the random forest fit using the selected features.

Note

See `ff` for additional arguments. Note that the matrix, Z, of features that do not go through the screening step must specified separately from the formula. `test_features` and `test_y` are not supported in formula interface. As in the `randomForest` package, for large data sets the formula interface may be substantially slower.

This work was partially funded by NSF IIS 1251151 and AMFAR 8721SC.

See Also

`wff`, `print.fuzzy_forest`, `predict.fuzzy_forest`, `modplot`

Examples

data(ctg)
y <- ctg$NSP
X <- ctg[, 2:22]
dat <- as.data.frame(cbind(y, X))
WGCNA_params <- WGCNA_control(p = 6, minModuleSize = 1, nThreads = 1)
mtry_factor <- 1; min_ntree <- 500; drop_fraction <- .5; ntree_factor <- 1
screen_params <- screen_control(drop_fraction = drop_fraction,
keep_fraction = .25, min_ntree = min_ntree,
ntree_factor = ntree_factor,
mtry_factor = mtry_factor)
select_params <- select_control(drop_fraction = drop_fraction,
number_selected = 5,
min_ntree = min_ntree,
ntree_factor = ntree_factor,
mtry_factor = mtry_factor)
wff_fit <- wff(y ~ ., data=dat,
WGCNA_params = WGCNA_params,
screen_params = screen_params,
select_params = select_params,
final_ntree = 500)

#extract variable importance rankings
vims <- wff_fit$feature_list

#plot results
modplot(wff_fit)

data(ctg)
y <- ctg$NSP
X <- ctg[, 2:22]
dat <- as.data.frame(cbind(y, X))
WGCNA_params <- WGCNA_control(p = 6, minModuleSize = 1, nThreads = 1)
mtry_factor <- 1; min_ntree <- 500; drop_fraction <- .5; ntree_factor <- 1
screen_params <- screen_control(drop_fraction = drop_fraction,
    keep_fraction = .25, min_ntree = min_ntree,
    ntree_factor = ntree_factor,
    mtry_factor = mtry_factor)
select_params <- select_control(drop_fraction = drop_fraction,
    number_selected = 5,
    min_ntree = min_ntree,
    ntree_factor = ntree_factor,
    mtry_factor = mtry_factor)
wff_fit <- wff(y ~ ., data=dat,
    WGCNA_params = WGCNA_params,
    screen_params = screen_params,
    select_params = select_params,
    final_ntree = 500)

#extract variable importance rankings
vims <- wff_fit$feature_list

#plot results
modplot(wff_fit)

---

### WGCNA_control

Set Parameters for WGCNA Step of Fuzzy Forests

**Description**

Creates `WGCNA_control` object for controlling WGCNA will be carried out.

**Usage**

`WGCNA_control(power = 6, ...)`

**Arguments**

- `power`  
  Power of adjacency function.
- `...`  
  Additional arguments. See `blockwiseModules` from the WGCNA package for details.

**Value**

An object of type `WGCNA_control`.

**Note**

This work was partially funded by NSF IIS 1251151.
References


Examples

```
WGCNA_params <- WGCNA_control(p=7, minModuleSize=30, TOMType = "unsigned",
    reassignThreshold = 0, mergeCutHeight = 0.25,
    numericLabels = TRUE, pamRespectsDendro = FALSE)
```
Index

*Topic **R**
  example_ff, 2
*Topic **datasets**
  ctg, 2
  Liver_Expr, 10
*Topic **object**
  example_ff, 2
c tg, 2
example_ff, 2
ff, 3, 5, 6, 11, 12, 20
ff.formula, 3, 4, 5, 11, 12
fuzzy_forest, 4, 6, 8, 18, 20
fuzzyforest, 8
fuzzyforest-package (fuzzyforest), 8
iterative_RF, 9
Liver_Expr, 10
modplot, 4, 6, 10, 18, 20
multi_class_lr, 11
  predict.fuzzy_forest, 4, 6, 12, 18, 20
print.fuzzy_forest, 4, 6, 13, 18, 20
screen_control, 3, 14, 18
select_control, 3, 15, 18
select_RF, 16
wff, 11, 12, 17, 19, 20
wff.formula, 11, 12, 17, 18, 19
WGCNA_control, 18, 21