**Durbin-Watson Test**

**Description**

Performs the Durbin-Watson test for autocorrelation of disturbances.

**Usage**

```r
dwtest(formula, order.by = NULL, alternative = c("greater", "two.sided", "less"),
       iterations = 15, exact = NULL, tol = 1e-10, data = list())
```

**Arguments**

- `formula`: a symbolic description for the model to be tested (or a fitted "lm" object).
- `order.by`: Either a vector `z` or a formula with a single explanatory variable like `~ z`. The observations in the model are ordered by the size of `z`. If set to `NULL` (the default) the observations are assumed to be ordered (e.g., a time series).
- `alternative`: a character string specifying the alternative hypothesis.
- `iterations`: an integer specifying the number of iterations when calculating the p-value with the "pan" algorithm.
- `exact`: logical. If set to `FALSE` a normal approximation will be used to compute the p value, if `TRUE` the "pan" algorithm is used. The default is to use "pan" if the sample size is < 100.
- `tol`: tolerance. Eigenvalues computed have to be greater than `tol` to be treated as non-zero.
- `data`: an optional data frame containing the variables in the model. By default the variables are taken from the environment which `dwtest` is called from.

**Details**

The Durbin-Watson test has the null hypothesis that the autocorrelation of the disturbances is 0. It is possible to test against the alternative that it is greater than, not equal to, or less than 0, respectively. This can be specified by the `alternative` argument.

Under the assumption of normally distributed disturbances, the null distribution of the Durbin-Watson statistic is the distribution of a linear combination of chi-squared variables. The p-value is computed using the Fortran version of Applied Statistics Algorithm AS 153 by Farebrother (1980, 1984). This algorithm is called "pan" or "gradsol". For large sample sizes the algorithm might fail to compute the p value; in that case a warning is printed and an approximate p value will be given; this p value is computed using a normal approximation with mean and variance of the Durbin-Watson test statistic.

Examples can not only be found on this page, but also on the help pages of the data sets `bondyield`, `currencysubstitution`, `growthofmoney`, `moneydemand`, `unemployment`, `wages`.

For an overview on R and econometrics see Racine & Hyndman (2002).

**Value**

An object of class "htest" containing:

- statistic: the test statistic.
- p.value: the corresponding p-value.
- method: a character string with the method used.
- data.name: a character string with the data name.

References


See Also

- *lm*

Examples

```r
## generate two AR(1) error terms with parameter
## rho = 0 (white noise) and rho = 0.9 respectively
err1 <- rnorm(100)

## generate regressor and dependent variable
x <- rep(c(-1,1), 50)
y1 <- 1 + x + err1

## perform Durbin-Watson test
dwtest(y1 ~ x)

err2 <- filter(err1, 0.9, method="recursive")
y2 <- 1 + x + err2
dwtest(y2 ~ x)
```

[Package *lmtest* version 0.9-33 [Index]]