

# Package: VarED (via r-universe)

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**Type** Package

**Title** Variance Estimation using Difference-Based Methods

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**Description** Generating functions for both optimal and ordinary  
difference sequences, and the difference-based estimation  
functions.

**Depends** R (>= 3.3.0)

**License** GPL-2

**NeedsCompilation** no

**Repository** CRAN

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optseq	<i>Optimal Difference Sequence</i>
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## Description

Generate an optimal difference sequence with order  $r(\leq 10)$ .

**Usage**

```
optseq(r)
```

**Arguments**

`r` the order of the generated difference sequence.

**Value**

The generated optimal difference sequence.

**References**

Hall, P., Kay, J. W. and Titterington, D. M. (1990). Asymptotically optimal difference-based estimation of variance in nonparametric regression, *Biometrika* 77: 521 - 528.

**Examples**

```
r<-2  
optseq(r)
```

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ordseq

*Ordinary Difference Sequence*

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**Description**

Generate an ordinary difference sequence with order `r`.

**Usage**

```
ordseq(r)
```

**Arguments**

`r` the order of the generated difference sequence.

**Value**

The generated ordinary difference sequence.

**References**

Hall, P., Kay, J. W. and Titterington, D. M. (1990). Asymptotically optimal difference-based estimation of variance in nonparametric regression, *Biometrika* 77: 521 - 528.

Dette, H., Munk, A. and Wagner, T. (1998). Estimating the variance in nonparametric regression - what is a reasonable choice?, *Journal of the Royal Statistical Society, Series B* 60: 751 - 764.

**Examples**

```
r<-2
ordseq(r)
```

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**vardif***Estimate Residual Variance with Differene-Based Method.*

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**Description**

Estimate residual variance with differene-based method.

**Usage**

```
vardif(x, y, type, r, m)
```

**Arguments**

x	numeric Equally spaced design points.
y	numeric Responses
type	character Taking "opt" or "ord", default as "ord"
r	numeric The order of employed difference sequence.
m	numeric The bandwidth or the number of regressors.

**Value**

u	numeric The estimated variance.
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**References**

Tong, T. and Wang, Y. (2005). Estimating residual variance in nonparametric regression using least squares, *Biometrika* 92: 821 - 830.

Wenlin Dai, Tiejun Tong and Lixing Zhu (2017) Optimal sequence or ordinary sequence? A unified framework for variance estimation in nonparametric regression, *Statistical Science*.

**Examples**

```
x<-1:100/100
y<-5*sin(2*pi*x)+rnorm(100)*0.5
type="ord"
r<-2
m<-10
vardif(x,y,type,r,m)
```

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