Package ‘polypoly’

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polypoly: Helper functions for orthogonal polynomials

Description
This package provides helpful functions for orthogonal polynomials created by \texttt{stats::poly()}. These include plotting \texttt{poly_plot()}, tidying \texttt{poly_melt()}, rescaling \texttt{poly_rescale()}, and manipulating a dataframe \texttt{poly_add_columns()}.  

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\texttt{poly_add_columns} 
Add orthogonal polynomial columns to a dataframe

Description
Add orthogonal polynomial columns to a dataframe

Usage
\begin{verbatim}
poly_add_columns(.data, .col, degree = 1, prefix = NULL, scale_width = NULL)
\end{verbatim}

Arguments
- \texttt{.data} a dataframe
- \texttt{.col} a bare column name
- \texttt{degree} number of polynomial terms to add to the dataframe
- \texttt{prefix} prefix for the names to add to the dataframe. default is the name of \texttt{.col}
- \texttt{scale_width} optionally rescale the dataframe using \texttt{poly_rescale()}. Default behavior is not to perform any rescaling.

Value
the dataframe with additional columns of orthogonal polynomial terms of \texttt{.col}

Examples
\begin{verbatim}
df <- data.frame(time = rep(1:5, 3), y = rnorm(15))

# adds columns "time1", "time2", "time3"
poly_add_columns(df, time, degree = 3)

# adds columns "t1", "t2", "t3 and rescale
poly_add_columns(df, time, degree = 3, prefix = "t", scale_width = 1)
\end{verbatim}
**poly_melt**

*Melt a polynomial matrix*

**Description**
Melt a polynomial matrix

**Usage**

```
poly_melt(x)
```

**Arguments**

- **x**: a matrix created by `stats::poly()`

**Details**
The degree values are returned as a character vector because they should be treated categorically (as when plotting). Moreover, matrices made with multiple vectors (e.g., `poly(rnorm(10), rnorm(10), degree = 2)`) have names that are not numerically meaningful (e.g., `1.0`, `2.0`, `0.1`, `1.1`, `0.2`).

**Value**

A `tibble::tibble()` with three columns: observation (row number of the matrix), polynomial degree, and value.

**Examples**

```r
m <- poly(rnorm(10), degree = 3)
poly_melt(m)
```

**poly_plot**

*Plot a polynomial matrix*

**Description**
Plot a polynomial matrix

**Usage**

```
poly_plot(x, by_observation = TRUE, x_col = 1)
```

```
poly_plot_data(x, by_observation = TRUE, x_col = 1)
```
Arguments

x  a matrix created by \texttt{stats::poly()}

by_observation whether the x axis should be mapped to the observation/row number (\texttt{TRUE}, the default) or to the degree-1 terms of the matrix (\texttt{FALSE})

x_col integer indicating which column to plot as the x-axis when \texttt{by_observation} is \texttt{FALSE}. Default is 1 (assumes the first column is the linear polynomial term).

Value

a \texttt{ggplot2::ggplot()} plot of the degree terms from the matrix. For \texttt{poly_plot_data()}, the dataframe used to create the plot is returned instead.

Examples

# Defaults to plotting using the row number as x-axis
m <- poly(1:100, degree = 3)
poly_plot(m)

# Not good because observations were not sorted
m2 <- poly(rnorm(100), degree = 3)
poly_plot(m2)

# Instead set \texttt{by_observation} to \texttt{FALSE} to plot along the degree 1 values
poly_plot(m2, by_observation = FALSE)

# Get a dataframe instead of plot
poly_plot_data(m2, by_observation = FALSE)

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\noptify{poly_rescale} Rescale the range of a polynomial matrix

Description

Rescale the range of a polynomial matrix

Usage

\texttt{poly_rescale(x, scale\_width = 1)}

Arguments

x a matrix created by \texttt{stats::poly()}

scale_width the desired range (max - min) for the first column of the matrix

Details

This function strips away the \texttt{poly} class and the \texttt{coef} attribute of the matrix. This is because those attributes no longer describe the transformed matrix.
poly_rescale

Value

the rescaled polynomial matrix (as a plain matrix with coefs attribute removed)

Examples

m <- poly(1:10, degree = 4)

# Difference between min and max values of first column is 10
scaled <- poly_rescale(m, scale_width = 10)
scaled

# Rescaled values are still orthogonal
zapsmall(cor(scaled))
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