bis557-hw1

Name: Brian Deng

```
library(bis557)
```

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The R package {bis557} was built to store all the functions and data used for this class, which focuses on creating statistical models and algorithms.

- `linear_model()` - create a linear model, similar to R's `lm()` function
- `grad_descent()` - the gradient descent algorithm used in ML

Dataset

Below is an example dataset, `lm_patho` from the {bis557} package, that can be used for linear regression.

```
library(bis557)
data(lm_patho)
head(lm_patho)
#>             y          x1     x2
#> 1  1.0000e+09 1000000000 -1e+00
#> 2 -9.9999e-01          -1  1e-05
```

Example: Linear Model

This is a basic example which shows you to create a linear model, for example, doing regression analysis.

$$y \sim \beta_1 x_1 + \beta_2 x_2$$

```
library(bis557)
data(lm_patho)
fit_linear_model <- linear_model(y ~., lm_patho)
```

Example: Gradient Descent

This is a basic example which shows you how to solve a common problem: Use an optimization algorithm, such as gradient descent, to find the coefficients of simple linear regression.

```
library(bis557)
data(lm_patho)
gd_patho <- grad_descent(X = lm_patho[,-1], y = lm_patho[,1],
                         b_0 = rep(1e-16, ncol(lm_patho)), learn_rate = 1.3e-16,
```

```
                          max_iter = 1e5)
gd_patho
#>             [,1]
#>    7.183209e-07
#> x1 1.000000e+00
#> x2 2.054128e-07
```