Linear Programming

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Definition

Objective function and constraints are both linear.

Library

```
library(tidyverse)
library(lpSolve)
```

Example

```
data <- tribble(
  ~x_cost_per_day, ~y_cost_per_day,
              180,            160
  )

production <- tribble(
  ~high, ~medium, ~low,
    6, 3, 4,
    1, 1, 6
)
```

Constraints

```
const_per_day <- t(production)
const_weekend <- matrix(c(1,0,0,1), nrow = 2, byrow = T)
const_negative <- matrix(c(1,0,0,1), nrow = 2, byrow = T)

constraints <- rbind(const_per_day, const_weekend, const_negative)
```

Model

```
lp_model <- lp(direction = "min",
               objective.in = t(data),
               const.mat = constraints,
               const.dir = c(">=", ">=", ">=", "<=", "<=", ">=", ">="),
               const.rhs = c(12, 8, 24, 5, 5, 0, 0))
```

Optimal Values of X and Y

```
lp_model$solution
```

```
## [1] 1.714286 2.857143
```

Objective at minimum

```
lp_model$objval
```

```
## [1] 765.7143
```