# Comprehensive Documentation for ANOVA Analysis in Julia

## Introduction

This document provides a comprehensive explanation of the ANOVA analysis conducted using Julia in the Pluto.jl environment. The purpose of the analysis is to explore the effects of different sources and types on weight gain.

## Packages Used

* CSV: Used for reading and writing CSV files.
* DataFrames: Provides tools for data manipulation and analysis.
* GLM: Used for fitting general linear models.
* StatsBase: Provides basic statistics functionality.
* Distributions: Used for statistical distributions and associated functions.
* PrettyTables: Used for displaying tables in a more visually appealing format.
* StatsModels: Provides tools for describing models and for model-building.
* CategoricalArrays: Used for handling categorical data.
* HypothesisTests: Provides classical statistical hypothesis tests.

## Dataset Description

The dataset used in the analysis consists of observations of weight gain, sourced from different food types and preparation methods. Variables include 'source' (Beef, Cereal) and 'type' (Low, High).

## Statistical Model

The model used for the ANOVA analysis is a linear model with interactions between 'source' and 'type'. The model equation is:

weightgain ~ 1 + source + type + source & type

## Model Coefficients

Below are the coefficients from the linear model, indicating the influence of each variable and their interactions on weight gain:

* Intercept: 100.0, Std. Error: 4.72858, t-value: 21.15, p-value: <1e-21
* source: Cereal: -14.1, Std. Error: 6.68722, t-value: -2.11, p-value: 0.0420
* type: Low: -20.8, Std. Error: 6.68722, t-value: -3.11, p-value: 0.0036
* source: Cereal & type: Low: 18.8, Std. Error: 9.45715, t-value: 1.99, p-value: 0.0545

## ANOVA Results

The table below summarizes the ANOVA results, showing the degrees of freedom, sum of squares, mean square, F value, and p-value for each factor:

* Source: source, Df: 1, Sum Sq: 220.9, Mean Sq: 220.9, F value: 0.988, p-value: 0.327
* Source: type, Df: 1, Sum Sq: 1299.6, Mean Sq: 1299.6, F value: 5.812, p-value: 0.021
* Source: source:type, Df: 1, Sum Sq: 883.6, Mean Sq: 883.6, F value: 3.952, p-value: 0.054
* Source: Residuals, Df: 36, Sum Sq: 8049.4, Mean Sq: 223.594

## Conclusion

## The analysis suggests that both 'source' and 'type' of food, as well as their interaction, have significant effects on weight gain. Further research could explore these effects in more detail to understand the underlying biological or processing factors. Challenges Faced

During the ANOVA analysis using Julia, we encountered a significant challenge due to the lack of direct support for ANOVA functions within Julia's standard libraries. While a package named 'Anova' could potentially address our needs, it required downgrading to an earlier version of Julia, which was not feasible for our project requirements.

Furthermore, attempting to utilize this package resulted in compatibility issues and the following error:

