

Lecture IV - Modelling with JuMP

Applied Optimization with Julia

Dr. Tobias Vlček

University of Hamburg - Fall 2024

Quick Recap from last Week

Functions

- Functions are reusable blocks of code
- Define functions using the `function` keyword
- Functions can take arguments and return values
- Use `return` to specify the output of a function

Packages

- Packages extend Julia's functionality
- Use `using Pkg` to access package management
- Install packages with `Pkg.add("PackageName")`
- Import packages with `using PackageName` or `import PackageName`

DataFrames

- DataFrames are used for working with tabular data
- Create DataFrames using the **DataFrame** constructor
- Access columns using dot notation or square brackets
- Perform operations on columns and rows

Input/Output (IO)

- IO operations allow reading from and writing to files
- Reading and writing CSV files can be done with the `CSV` package
- Use `CSV.read()` to read a CSV file into a DataFrame
- Use `CSV.write()` to write a DataFrame to a CSV file

Plots

- Plotting in Julia is done through packages like Plots.jl
- Create basic plots with functions like `plot()`, `scatter()`, `bar()`
- Customize plots with attributes like `title`, `xlabel`, `ylabel`

Solutions from last Week

- The tutorials from last week will again be **available on Friday**
- You can access them in the project folder on Github
- Click on the little cat icon on the bottom right

Five Tutorials for this Week

Topics of the Tutorials

- **JuMP:** Learn how to use JuMP to define optimization problems
- **Variable Bounds:** Learn how to set variable bounds
- **Constrains:** Learn how to add constraints to your model
- **Advanced Modeling:** Learn how to model more complex problems
- **Transport Problem:** Learn how to solve a transportation problem

Get started with the tutorials

- Download this weeks tutorials and start with the first one
- **Remember, you can ask questions anytime!**

Literature

Literature

- Lauwens, B., & Downey, A. B. (2019). Think Julia: How to think like a computer scientist (First edition). O'Reilly®. [Link to the free book website.](#)
- [Julia Documentation](#)

For more interesting literature to learn more about Julia, take a look at the [literature list](#) of this course.