## Operations research with Julia/JuMP

Pedro Belin Castellucci

November, 2016

# Mathematical programming

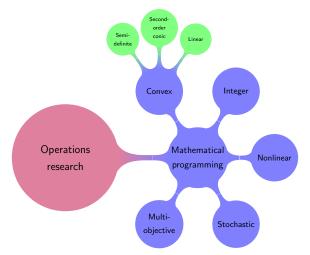


Figure 1: Information from this link.

#### Which can JuMP handle?

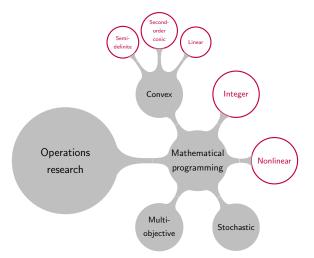


Figure 2: For JuMP documentation click on this link.

#### What we will do?

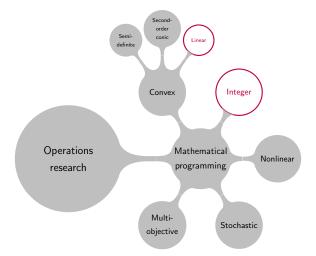


Figure 3: For JuMP documentation click on this link.

Min 
$$c^T x$$
,

subject to:

$$Ax + By = D$$
,

$$x \in \mathbb{R}$$
,

$$y \in \mathbb{Z}$$
.

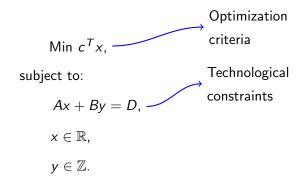
$$\begin{array}{c}
\text{Optimization} \\
\text{Min } c^T x, \\
\end{array}$$

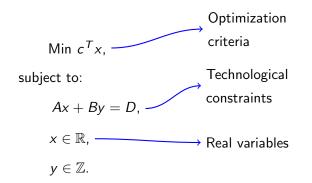
subject to:

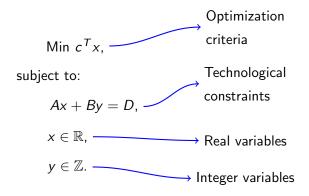
$$Ax + By = D$$
,

$$x \in \mathbb{R}$$
,

$$y \in \mathbb{Z}$$
.







### An example

Min 
$$2x + 3y$$
,

#### subject to:

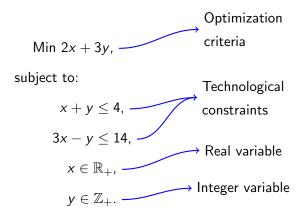
$$x + y \leq 4$$
,

$$3x - y \le 14$$
,

$$x \in \mathbb{R}_+$$
,

$$y \in \mathbb{Z}_+$$
.

## An example



Domain-specific modeling language.

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User friendliness.

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Speed:

Creates problems at similar speed of other modeling languages (e. g. AMPL).

Communicates with solver in memory.

Domain-specific modeling language.

User friendliness.

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Communicates with solver in memory.

#### Solver independence:

Current supports Artelys Knitro, Bonmin, Cbc, Clp, Couenne, CPLEX, ECOS, FICO Xpress, GLPK, Gurobi, Ipopt, MOSEK, NLopt, and SCS.