

Taller cero

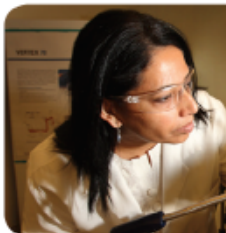
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2020

Problema de la Mochila

Se tiene una mochila con un volumen máximo de carga. (20L, 40L). Se tienen unos artículos para ser empacados en la mochila. Cada artículo tiene un nivel de satisfacción y un volumen de ocupación. Encontrar el conjunto de artículos que maximicen la satisfacción.



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service
in the
national
interest*

1. Overview of Pyomo



Sandia National Laboratories is a multimission laboratory owned subsidiary of Honeywell International, Inc., for

<http://www.pyomo.org/workshop-examples>

Optimization Modeling

Goal:

- Provide a natural syntax to describe mathematical models
- Formulate large models with a concise syntax
- Separate modeling and data declarations
- Enable data import and export in commonly used formats

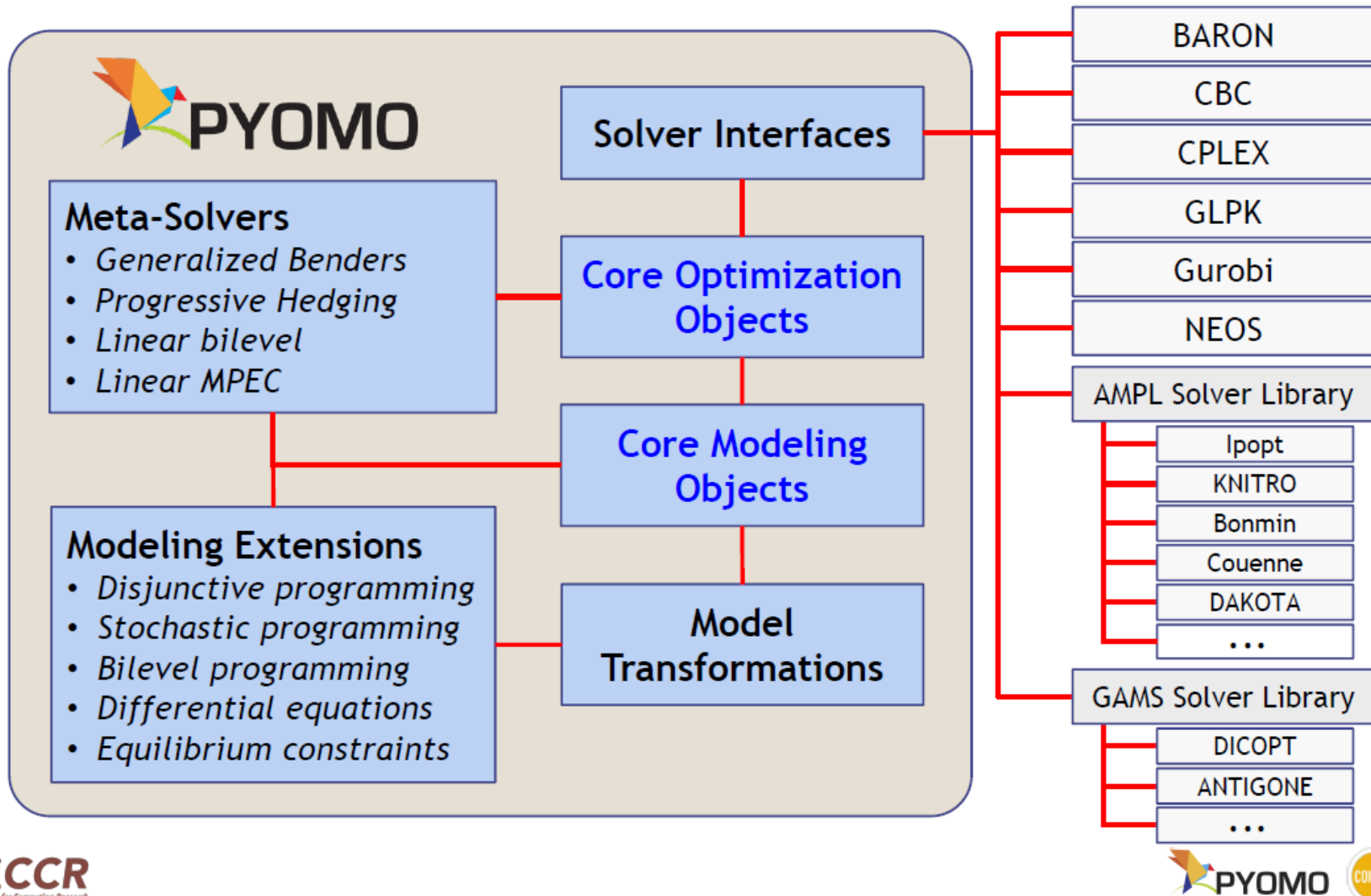
Impact:

- Robustly model large systems
- Integrated automatic differentiation for complex nonlinear models

Examples:

- AMPL, GAMS, AIMMS, ...
- OptimJ, FlopCPP, PuLP, JuMP, ...
- **Pyomo: A Python-based optimization modeling package**

Pyomo at a Glance



Why Open Source?

- Transparency and reliability
- Foster community involvement
 - Extend the modeling language
 - Develop new solvers / algorithms
 - Interface with additional external utilities
 - “Stone Soup” model
- Flexible licensing
 - Pyomo released under 3-clause BSD license
 - No restrictions on deployment or commercial use

For More Information

See the Pyomo homepage

- www.pyomo.org

The Pyomo homepage provides a portal for:

- Online documentation
- Installation instructions
- Help information
- Developer links

GitHub:

- github.com/Pyomo



HOME / ABOUT / DOWNLOAD / DOCUMENTATION / BLOG

```
set Scenarios := BelowAverageScenario  
AverageScenario  
AboveAverageScenario ;
```

```
set StageVariables[FirstStage] := DevotedAcreage["1"] ;  
set StageVariables[SecondStage] := QuantitySubQuotaSold["1"]  
QuantitySuperQuotaSold["1"]  
QuantityPurchased["1"] ;
```



```
--model.CattleFeedRequirement = Param(model.CROPS, within=NonNegativeReals)  
model.PurchasePrice = Param(model.CROPS, within=PositiveReals)  
model.PlantingCostPerAcre = Param(model.CROPS, within=PositiveReals)  
model.Yield = Param(model.CROPS, within=NonNegativeReals)  
model.DevotedAcreage = Var(model.CROPS, bounds=(0.0, model.TOTAL_ACREAGE))  
model.QuantitySubQuotaSold = Var(model.CROPS, bounds=(0.0, None))  
model.QuantitySuperQuotaSold = Var(model.CROPS, bounds=(0.0, None))
```

Parallel stochastic programming
in PySP



What Is Pyomo?

Pyomo is a Python-based, open-source optimization modeling language with a diverse set of optimization capabilities.

[Read More](#)

Installation

The easiest way to install Pyomo is to use pip. Pyomo also needs access to optimization solvers.

[Read more](#)

Latest: Pyomo 4.4

Docs and Examples

Pyomo documentation and examples are available online. Pyomo is also described in book and journal publications.

[Read more](#)

Acknowledgments

The Pyomo project would not be where it is without the generous contributions of numerous people and organizations.

[Read More](#)

Getting Help

Users and developers provide help online:

- [Questions on StackExchange](#)
- [Discussions on Pyomo Forum](#)

ASK A QUESTION

Who Uses Pyomo?

Pyomo is used by researchers to solve complex real-world applications.

[Read More](#)

Simple Modeling Example: Classic Knapsack Problem

- Given a set of items A , with weight and value (benefit)
- Goal: select a subset of these items
 - Maximize the benefit
 - Under weight limit

Item (A)	Weight (w)	Benefit (b)
hammer	5	8
wrench	7	3
screwdriver	4	6
towel	3	11
Max weight:		14

Symbol	Meaning
A	set of items available for purchase
b_i	benefit of item i
w_i	weight of item i
W_{\max}	max weight that can be carried
x_i	discrete variable (select i or not)

Anatomy of a Concrete Pyomo Model

$$\begin{aligned} \max_x \quad & \sum_{i \in A} b_i x_i \\ \text{s.t.} \quad & \sum_{i \in A} w_i x_i \leq W_{\max} \\ & x_i \in \{0,1\} \quad \forall i \in A \end{aligned}$$

Item	Weight	Value
hammer	5	8
wrench	7	3
screwdriver	4	6
towel	3	11

```
from pyomo.environ import *

A = ['hammer', 'wrench', 'screwdriver', 'towel']
b = {'hammer':8, 'wrench':3, 'screwdriver':6, 'towel':11}
w = {'hammer':5, 'wrench':7, 'screwdriver':4, 'towel':3}
W_max = 14

model = ConcreteModel()
model.x = Var( A, within=Binary )

model.value = Objective(
    expr = sum( b[i]*model.x[i] for i in A ),
    sense = maximize )

model.weight = Constraint(
    expr = sum( w[i]*model.x[i] for i in A ) <= W_max )

opt = SolverFactory('glpk')
result_obj = opt.solve(model, tee=True)

model.pprint()
```

← Import packages

← Specify/import data

Can be imported or even
applied to model later

← Define problem

← Solve problem

← Report results

Taller cero

1. Desarrollar modelo de Python con la formulación del problema de la Mochila propuesta.
2. Hacer un informe .pdf con la siguiente información:
 - Nombre y cédula del estudiante
 - Escribir la solución óptima del problema
 - Describir en palabras una variación del problema de la mochila como un problema de minimización
3. Enviar el informe .pdf al correo mauricio.carreno@udea.edu.co antes de las 4:00 pm. En el asunto escribir:

nombre – cédula – taller0 – fecha(dd-mm-yyyy)