

AMPL everywhere:

Build optimization applications quickly and reliably, from prototyping to deployment

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AMPL & Solvers in Python Packages



> <https://amplpy.readthedocs.io> (Windows, MacOS, Linux)

```
# Install Python API for AMPL
$ python -m pip install amplpy --upgrade

# Install solver modules (e.g., HiGHS, CBC, Gurobi)
$ python -m amplpy.modules install highs cbc gurobi

# Activate your license (e.g., free https://ampl.com/ce license)
$ python -m amplpy.modules activate <license-uuid>

# Import in Python
$ python
>>> from amplpy import AMPL
>>> ampl = AMPL() # instantiate AMPL object
```

> Other APIs: Matlab, R, Java, C++, C#

Running on jupyter Notebooks

AMPL Colab Repo



AMPL
Community Edition

<https://colab.ampl.com>

```
[1] # Install dependencies
!pip install -q amplpy

from amplpy import tools

ampl = tools.ampl_notebook(
    modules=["highs", "knitro"],
    license_uuid="your-license-uuid")
```

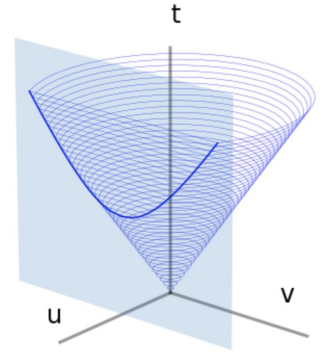
MO-BOOK

Data-Driven Mathematical Optimization Book

> Authors: Postek, Zocca, Gromicho & Kantor (2023)

> Classroom teaching material, and building optimization models for data-rich applications in Python.

> mo-book-with-ampl.readthedocs.io



AMPL + Streamlit

Visual web applications

- > Examples: <https://amplpt.streamlit.app>
- > Hosted by Streamlit cloud
- > Documentation: <https://docs.streamlit.io>



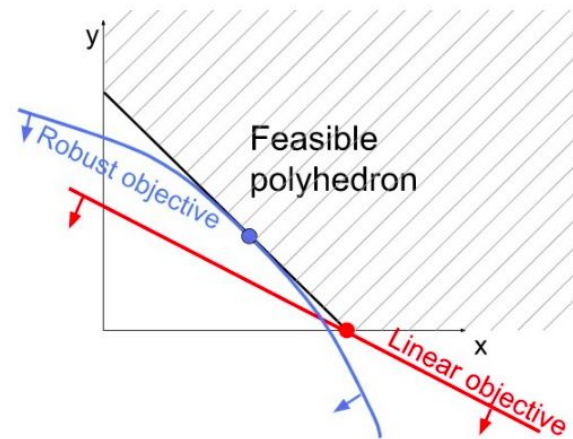
Streamlit

Pick the tip 🌟

Tip #6: Robust Linear Programming with Ellipsoidal Uncertainty

💡 Tip #6: Robust Linear Programming with Ellipsoidal Uncertainty

Sometimes values are not known exactly!



Commercial solvers (Kestrel-Neos)



> <https://neos-server.org/neos/>

> <https://github.com/ampl/gokestrel>



> AMPL for teaching?

AMPL on Docker containers



> Easiest deployment ever (also CI/CD)

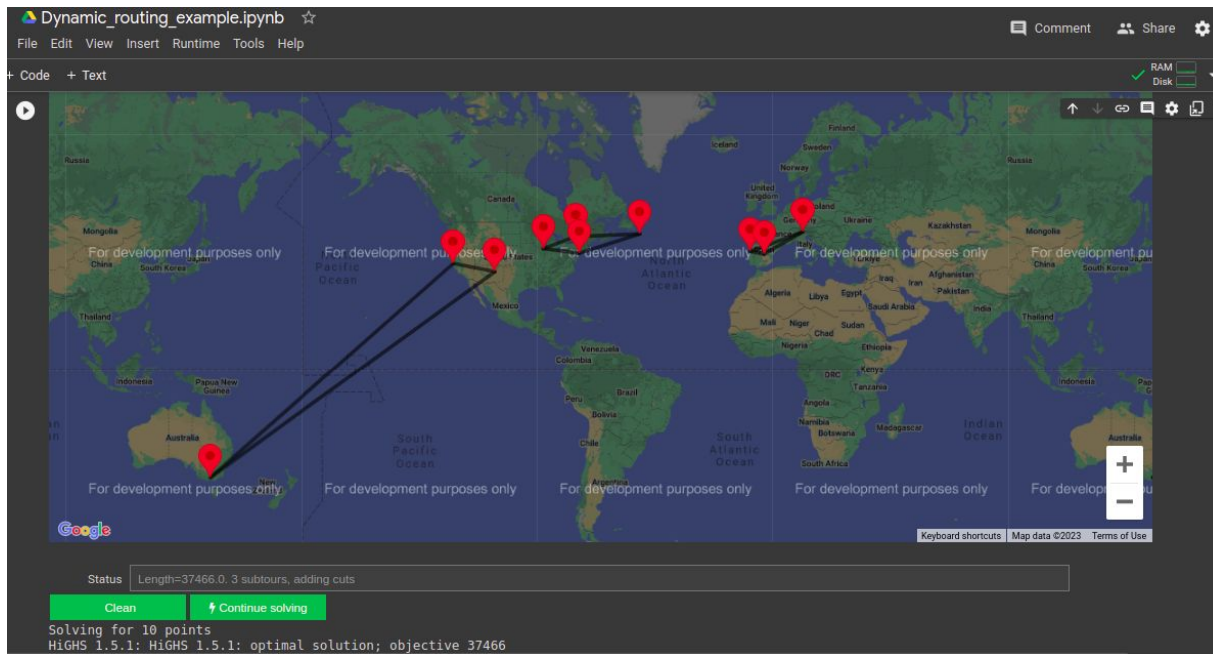
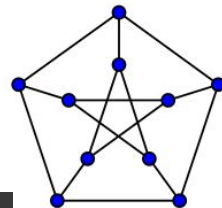
```
# Use any image as base image with python installed  
FROM python:3.9-slim-bullseye  
  
# Install amplpy and all necessary amplpy.modules:  
RUN python -m pip install amplpy --no-cache-dir # Install amplpy  
RUN python -m amplpy.modules install highs gurobi --no-cache-dir # Install modules
```

> Documentation: <https://dev.ampl.com/ampl/docker/>

> Example: <https://github.com/ampl/amplpyfinance/tree/master/deployment/docker>

Dynamic Routing Example

TSP with User Interface and Google Maps



> Example: <https://colab.research.google.com/drive/1NCSoEhBZ0SpcDq0EtW6QDuwmgTvOZ7LA>

X-AMPL

Experimental modeling features

> `snapshot` to save and restore ampl sessions

```
marcos:~$ x-ampl
ampl: include diet.run;
Gurobi 10.0.0: optimal solution; objective 88.2
1 simplex iterations
ampl: snapshot > snapshot_file.run;
ampl: quit;
marcos:~$ x-ampl
```



```
marcos:~$ x-ampl
ampl: include snapshot_file.run;
ampl: display Total_Cost, Buy;
Total_Cost = 88.2

Buy [*] :=
BEEF  0
  CHK  0
FISH  0
  HAM  0
MCH  46.6667
MTL   0
SPG   0
TUR   0
;

ampl:
ampl: option solver;
option solver gurobi;
ampl: □
```



AMPL
Community Edition

Try?

> try.ampl.com



Thanks for your attention!

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