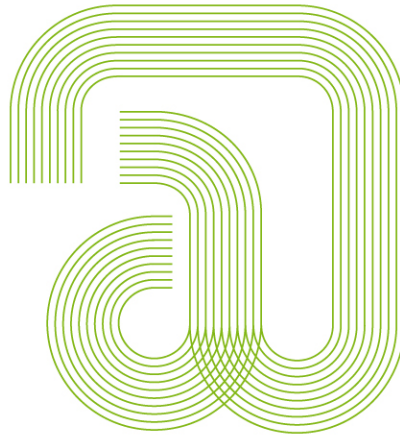


Universidade de Vigo

## Evolutionary Computation – Lab-Sessions



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## 1. First Week

**Objectives:** Install all necessary packages in python (maybe we will extend the tools in the following weeks). Run the jupyter notebooks to check that everything works. Get some first impressions of how genetic algorithms (and other heuristic algorithms) work on two problems: minimizing a real-valued multi-dimensional function and the traveling salesperson problem (TSP).

1. Download all files necessary for this week from the web-page <http://formella.webs.uvigo.es/doc/ec24/index.html> or from the corresponding teaching platform available at your university.
2. Install all necessary python components, including the scikit-opt package from <https://github.com/guofei9987/scikit-opt>
  - a) For instance, look at <https://docs.anaconda.com/anaconda/install> on how to install Python with the Anaconda distribution.
  - b) Under a decent Linux system you might proceed as follows (note that roughly **7 GB** of disk space will be used):

```
# navigate to a suitable location in your filesystem, for instance:
mkdir EC_files
cd EC_files
# download anaconda installer and install according to your preferences
wget https://repo.anaconda.com/archive/Anaconda3-2024.10-1-Linux-x86_64.sh
bash Anaconda3-2024.10-1-Linux-x86_64.sh
# download zip-file of source-code from site (maybe same location)
# https://github.com/guofei9987/scikit-opt
unzip scikit-opt-master.zip
cd scikit-opt-master
pip install .
# this should install the version 0.6.6 from the local directory
# if you like python-files synchronized with jupyter notebooks
conda install jupyter
jupytertext --set-formats ipynb,py:percent FirstSession_tsp.ipynb --sync
# or whatever files you want to synchronize
```

You find jupytertext documentation at <https://jupytertext.readthedocs.io/en/latest/>

- c) Under Windows or Mac, please refer to the documentation of your system and the packages how to proceed with an installation.
3. Take a look at the web-pages:
    - a) <https://www.sfu.ca/~ssurjano/optimization.html>
    - b) <https://www.kaggle.com/code/kooaslansefat/cec-2017-benchmark>
    - c) <http://comopt.ifl.uni-heidelberg.de/software/TSPLIB95/>
  4. Run the 2 jupyter notebooks to check whether everything works fine.
  5. Play around with the parameters regarding: objective functions, genetic algorithm parameters, Monte Carlo rounds, underlying datasets, etc.
  6. Generate some statistics output, especially mean and variance, for a certain number of Monte Carlo rounds and genetic algorithm iterations for parameter sets that you found interesting.