Multiple Targets

Problem: If there are many better places than my current position, it is easier to improve. The slope to the better positions is important.

Results (starting from a local optimum)

- Key insights: Using global moves works very well. In the case of guiding information, warm restarts are also very useful.

Basins of Attraction

An area so attractive that local exploration (\( \rho \)) always leads to the same (local) optima.

Problem: If the basin of attraction is large but suboptimal, it is hard to escape.

Results

- Key insights: Restarts are beneficial and better than larger search distances if the basin of attraction is the global optimum.

Equipment

As an adventurer, you have two possibilities of advancing your search:

- explore at a set distance, never going to worse places
- call the helicopter

Iterated Optima

We consider a sequence of optima that is improving in the distance to the starting position. In between these optima, there are worse positions but with guiding information.

Problem: Reaching one optimum can be costly. Doing so multiple times can become more challenging.

Results (starting from a local optimum)

- Key insights: Using larger search distances helps. However, restarting does not, as each restart only has a decent chance to be successful so that iterated optima pose a problem.

Deceptive vs. Guiding Information

Information about a slope is deceptive if local exploration (\( \rho \)) leads to a local optimum. It is guiding if \( \rho \) leads to a global optimum.

Problem: If deceptive regions are large, they are hard to overcome. If guiding information is close to a local optimum, one can still land in the local optimum if the search distance is too large.

Results (starting from a local optimum)

- Key insights: Larger search distances are useful. Warm restarts only work for guiding information, but they do so very well.

Conclusion

Any modification to basic local exploration is useful. Each modification has advantages and disadvantages. For our settings, using larger search distances proves typically more useful than using restarts.