



ESPO Platform

Uncertainty Modeling Toolbox

Scenario Reduction Source Code Using Fast-Forward Technique

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Introduction

Scenario-based stochastic programming approach is known as a practical uncertainty handling method in energy systems planning and operation. However, it needs a large number of scenarios to appropriately cover uncertainty that entails high computation cost, and even problem intractability. Scenario reduction techniques can be used to reduce the size of original scenario set. The resulting reduced scenario set encompasses the most of available information in the original one.

Aims

ESPO aims to develop an uncertainty modeling toolbox to reduce the original scenario set. The main features of the toolbox are:

- To receive the original set of scenarios, as well as their probability of occurrence, and the size of reduced set.
- To implement the fast-forward scenario reduction technique [1].
- To select the reduced scenario set and generate the corresponding probability distribution.

Applications

The toolbox is built as a MATLAB source code. It can receive the scenarios of uncertain data in planning and operation problems, as well as the size of reduced set from the user, and select the ones with the most information available in the input data. The input scenarios can be the possible future realizations of uncertain parameters in short-term and long-term periods. Note that the scenarios of independent uncertainties can be individually reduced, but the scenarios of all dependent uncertainties must be incorporated into an input data-base and then jointly reduced.

Acknowledgement

This source code was originally produced by the researchers (Miguel Carrión, Salvador Pineda, Juan M Morales and Morteza Rahimiyan) in Ciudad Real, Spain, at 2010.

References

- [1] H. Heitsch and W. Romisch, “Scenario reduction algorithms in stochastic programming,” *Comput. Optimiz. Appl.*, vol. 24, no. 2-3, pp. 187–206, 2003