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Real Options Valuation: A Dynamic Programming Approach

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The theory of real option analysis (ROA) is considered as an advanced project valuation technique, which respects the value of future project alternations (*real options*).

To our best knowledge, the current state of ROA does not offer a unified valuation algorithm that would be able to cover valuations of more complex projects, such as those with multiple random variables or different types and a larger number of possible actions.

This thesis takes the problem of ROA and tries to interpret it as a problem of decision-making under uncertainty from the statistical decision theory (SDT).
We present a general valuation algorithm that builds on the knowledge of SDT, covers the solutions proposed by ROA and preserves the business-specific concepts as time value of money and risk aversion of investors.

This algorithm's usage is demonstrated on a problem of gas power plant's valuation, where the problem of uncountable state space is solved via the approximate dynamic programming technique of value function approximation, where we use piecewise linear models to cover the option-like structure.

Primary author: ROLENEC, Filip (Department of Mathematics, FNSPE, Czech Technical University in Prague)

Presenter: ROLENEC, Filip (Department of Mathematics, FNSPE, Czech Technical University in Prague)

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