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Institutionen för informationsteknologi

Besöksadress:
hus 10, Lägerhyddsvägen 1

Postadress:
Box 337
SE-751 05 UPPSALA

Telefon:
018–471 0000 (växel)

Telefax:
018-471 20 00

Hemsida:
http:/www.it.uu.se/

Department of Information Technology

Visiting address:
hus 10, Lägerhyddsvägen 1

Postal address:
Box 337
SE-751 05 Uppsala
SWEDEN

Telephone:
+46 18–471 0000 (switch)

Telefax:
+46 18-471 20 00

Web page:
http:/www.it.uu.se/

Assignment - Monte Carlo methods vs. Finite difference methods

- Your task is to make a thourough comparison between Monte-Carlo methods and finite difference methods to price options.
- Your investigations shall result in a complete, self-contained report.
- The report can have the following structure:
  - **Introduction**
    Give a general overview of your task (pricing of European options using CEV-model)
  - **Numerical methods - overview**
    Give a short presentation of the three different types of numerical methods that we have discussed to price options - lattice methods, Monte-Carlo methods, finite difference methods.
  - **Numerical results**
    Present main results from your implementations of Monte-Carlo methods and finite difference methods. From this point forward you don't have to include lattice methods in your report.
  - **Discussion of results**
    Your discussion should focus on:
    * implementation aspects (how difficult are they to implement)
    * accuracy aspects (what is the convergence rate, how efficient is the method to obtain an accurate result)

    Your discussion shall include :
    * options on several underlying assets. How does the solution process change for both methods and how does this affect the usefulness of the methods? What is the effect on computational efficiency and memory demand for the two types of methods? What is the structure of the matrix that you obtain from a finite difference-discretization for a d-dimensional problem? You don't have to make an implementation of a high-dimensional solver, you shall only discuss this on a theoretical basis.
    * computation of the Greeks. How are they computed in each case and how efficient is this? Run your codes and compute Δ using both a Monte-Carlo method and a finite difference method. Compare your obtained results with the exact formula that you find in your textbook (Appendix A4 - the solution and the greeks).

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- You may change the disposition of your report but you still have to cover the above items.

You have the opportunity to have tutoring approx. 10 min/group. Book a time slot in the doodle (https://doodle.com/bp/filipmarttala/assignment-3-tutoring). Your report should be uploaded in the Student Portal no later than September 23 along with the code that you've been using.

During September 23-September 25 there will be a questionnaire open in the student portal that you all have to answer individually.

Good luck!