



Adjoint Algorithmic Differentiation Masterclass

<http://www.training.risk.net/adjoint-algorithmic-differentiation/static/home>

London

21st and 22nd of March



Dear Delegate,

Welcome to the **Adjoint Algorithmic Differentiation Masterclass** training course by Risk.net. Below are a few notes concerning administration, which I would be grateful if you would read.

Documentation

Please take your documentation with you at the end of each day. InfoPro Digital cannot take responsibility for lost documentation. All course documentation is now available online, and any missing presentations will be added after the course:

To access material after the training course, please enter the link below:

<http://www.training.risk.net/adjoint-algorithmic-differentiation/static/home>

Follow the 'Presentations' link to the password protected site and enter the password

AADM2018

Messages

If someone needs to reach you during the course, they should call the venue and ask for the InfoPro Digital course registration desk. The member of staff at the registration desk will take messages for you. Please report to the registration desk for your messages.

Course Evaluation

We would be grateful if you could take the time to fill in the course evaluation form given to you at registration as this provides us with valuable feedback for our speakers and helps us to improve our future events.

We hope you find the course interesting and valuable. If you do have any queries about registration or your course documentation, please do not hesitate to contact me for further assistance.

Kind Regards,

Silvia Di Spigno

Event Manager

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Thursday, 15th March 2018

Day 1 | AAD by Hand Coding

08:30 Coffee and Registration

09:00 Introduction to First-Order AAD (Presentation and Live Coding)

- Motivation and derivation of first derivative models
- First derivative (tangent and adjoint) code generation rules
- Live coded example

10:30 Coffee Break

11:00 Hands-on First-Order AAD (Supervised Exercise)

- First-order adjoint version of Monte Carlo solver for SDE
- First-order adjoint version of finite difference solver for PDE

12:30 Lunch

13:30 Introduction to Second (and Higher) Order AAD (Presentation and Live Coding)

- Motivation and derivation of second (and higher) derivative models
- Second derivative code by recursive application of tangent and adjoint code generation rules
- Live coded example

1500 Coffee Break

15:30 Hands-on Second-Order AAD (Supervised Exercise)

- Second-order adjoint version of Monte Carlo solver for SDE
- Second-order adjoint version of finite difference solver for PDE

17:00 End of Day One



Friday 22nd March 2018

Day Two | AAD in C/C++ by dco/c++ and Advanced AAD

The AAD software tool `dco/c++` targets C and C++ explicitly. AAD tools for other languages exist. Their discussion is beyond the scope of this course.

08:30 Coffee and Registration

09:00 Introduction to AAD Software Tool `dco/c++` (Presentation and Live Coding)

- Implementation of first (and higher) derivative models by operator and function overloading and template metaprogramming
- Live coded examples

10:30 Coffee Break

11:00 Hands-on First-Order AAD with `dco/c++` (Supervised Exercise)

- First-order adjoint version of Monte Carlo solver for SDE by `dco/c++`
- First-order adjoint version of finite difference solver for PDE by `dco/c++`
- Optionally: second-order adjoint versions

12:30 Lunch

13:30 Advanced AAD: Reducing the Memory Requirement of Adjoint Code (Presentation)

- Motivation: Checkpointing ensembles and evolutions
- Live coded examples (SDE/PDE)
- Outlook: Multi-level checkpointing and call tree reversal

15:00 Coffee Break

15:30 Advanced AAD: Implicit Functions, Parallelism, GPU, Structure and Sparsity (Presentation)

- Symbolic adjoints of implicit functions
- Handling and exploitation of shared and distributed memory parallelism in AAD
- AAD on GPUs
- Detection and exploitation of sparsity in Jacobians and Hessians

17:00 End of Course