Automatic Differentiation: Tools and Techniques

Paul D Hovland

hovland@mcs.anl.gov

Argonne National Laboratory, USA

We provide an overview of automatic differentiation tools, discussing their current capabilities and probable advances in the coming years. We discuss the use of automatic differentiation in conjunction with toolkits for scientific computing, with particular emphasis on some of the challenges encountered and possible mechanisms for overcoming these challenges. We conclude with a short survey of applications and empirical observations.