

Computing derivatives of code - with code - is one of the key enablers of the machine learning revolution. In computer graphics, automatic differentiation allows to solve inverse rendering problems. There, parameters such as an objects reflectance, position, or the scattering- and absorption coefficients of a volume, are recovered from one or several input images. In this work, we consider appearance matching and fabrication problems, that can be cast as instances of inverse rendering problems. While gradient-based optimization that is enabled by differentiable programs has the potential to yield very good results, it requires proper handling - differentiable rendering is not a shotgun-type problem solver. We discuss both theoretical concepts and the practical implementation of differentiable rendering algorithms, and show how they connect to different appearance matching problems.