UNC Fall 2019

MATH768: Mathematical Modeling I

An exploration of the synthesis of continuum mechanics with stochastic machine learning

Time & Place: MWF 2:30-3:20PM, Phillips Hall Room 385, UNC, Chapel Hill

Instructor:

Sorin Mitran

Website: http://mitran-lab.amath.unc.edu/courses/MATH768/MATH768.xhtml

- A two-track presentation of modeling of continua through:
    1. Classical partial differential equation approaches with hypothesized constitutive relation closures
    2. Application of deep learning to extract constitutive equations from data
- Classical models (Cauchy elasticity, Navier-Stokes flow) are recovered through deep learning
- Deep learning allows consideration of much more complicated behavior such as that encountered in biological media: cytoskeleton, tissue, polymeric flow
- Hands-on introduction to TensorFlow, Mathematica neural networks