

1 Notes on Deep Partial Differential Equations

1.1 The Deep Galerkin Method

Drawbacks of grid methods

Numerical methods based on grids often fail when dimensionality becomes too large. (b/c grid points exponential in dimension). Stability also much huge mesh sizes

Advantages of DGM

Mesh free.

?Computational graph?

Training Method:

Randomly sample points from region where function defined

?Why do expect having a good fit on the boundary to be a good fit inside? If harmonic then this makes sense. Maybe work for good class of PDEs?

Mathematical Formulation:

We define $f(t, x; \theta)$ with parameter θ (fitting parameter) - actually these are given by neural network

?How do we compute differential operator loss? -Because we have f approximation defined everywhere

ν term is density, describes mass of space. Distribution of space

Approximation works for class of quasilinear parabolic PDE

1.2 Comparisons

runge kutta?

1.3 Ideas

Approximate other functions? Ray tracing equation?

References