

In many cases, massive data can be represented as unstructured point clouds in high dimensional spaces. Partial differential equation (PDE) provides a powerful tool to deal with such huge amount of data. We proposed a numerical method, the Point Integral Method (PIM), to solve PDEs over point clouds.

In order to use PIM, we do not need to generate meshes from point clouds. With this advantage, it can solve Laplace equation and its generalizations directly on point clouds in high dimensional spaces. PIM has been successfully applied to solve problems in computer vision and image processing. It is also a potential tool to attack certain problems in data science.