EVALUATING SPATIAL INTERPOLATION TECHNIQUES FOR PRECISION AGRICULTURE USING SOYBEAN YIELD DATA

An Abstract of

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ABSTRACT

Agricultural practices are the lifeblood of most societies. This being the case, advancements in agriculture are important. Precision Agriculture is the latest form of agricultural advancement. The purpose of this thesis is to examine how to best interpolate soybean yield as well as investigate if there are any environmental variables which influence yield.

The study area for this thesis was a 180 acre field in western Illinois. Dense yield data were randomly sub-sampled to lower densities to determine which sampling density was optimal (balancing accuracy and number of points) for yield interpolation. The optimal sampling density was then used to determine which interpolation algorithm (among natural neighbor, spline, and kriging) was most accurate. Environmental variables were tested in conjunction with interpolation because they could potentially disrupt the overall trend of yield, thereby making interpolation results less accurate. Topography and soil series were both tested for their influence on yield.

Kriging was found to be the most accurate interpolation algorithm at the optimal sampling density (8.5 points per acre). Natural neighbor was nearly as accurate, and as sampling density increased natural neighbor became more accurate than kriging. Topographical variables of relative elevation and slope were both found to have a correlation to the smoothed yield. T-tests performed on the soil series yield found that there were significant differences in yield in different soil series. Agriculture is an important practice throughout the world and increasing yield is a primary goal. The results of this thesis are just one piece in the puzzle toward increasing yield using Precision Agriculture technologies.