Proceedings of the Annual General Donald R. Keith Memorial Conference
West Point, New York, USA
April 30, 2015
A Regional Conference of the Society for Industrial and Systems Engineering

Modeling the Human Terrain in a Geospatial Framework

Christian Carrasco, Benjamin Hatton, Alex Newsome, Walter Griffin, and Pierre Han

Department of Systems Engineering
United States Military Academy
West Point, New York

Email: Christian.Carrasco@usma.edu

The views expressed herein are those of the author and do not reflect the position of the United States Military Academy, the Department of the Army, or the Department of Defense.

Author Note: The authors would like to thank the Engineer Research and Development Center: Geospatial Research Laboratory for their support throughout this project.

Abstract: This paper describes the development and application of an evaluation methodology which establishes a standardized framework for analyzing and modeling various domains within the Human Terrain. This research effort is intended to provide a geospatial modeling capability to military commanders and intelligence analysts for operational planning. The standardized framework is developed by synthesizing two sets of planning variables found in military doctrine (Operational and Mission) to isolate critical Human Terrain factors and derive relevant information requirements. These factors are referenced against four data sources (National Statistics Bureaus, Global Data on Events, Location and Tone (GDELT), the World Bank, and the Gridded Population of the World, to create arrays of geo-referenced Human Terrain data unique to each factor and information requirement. Geo-statistical and point density analyses are then applied to the data arrays to determine accuracy and ensure visual suitability. These refined data arrays are then used to develop geospatial planning aids using Esri's ArcMap Model Builder. The framework and geospatial artifacts provide military planners with an automated process in which to better understand the Human Terrain dimension within the operational environment.

Keywords: Geospatial, Human Terrain, ArcGIS, Systems Thinking, Point Density, Cluster Analysis, Hot Spot Analysis