



Filling in the Gaps: Applications of Deep Learning, Satellite Imagery, and High Performance Computing for the Estimation and Distribution of Geospatial Data

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Abstract

Many regions around the world suffer from a lack of authoritatively-collected data on factors critical to understanding human well-being. This challenges our ability to understand the progress society is making towards reducing poverty, improving lifespans, or otherwise improving livelihoods. A growing body of research is exploring how deep learning algorithms can be used to produce novel estimates of sparse development data, and how access to such data can impact development efforts. This dissertation contributes to this literature in three parts. First, using Landsat 8 satellite imagery and data from the Armed Conflict Location & Event Data Project, convolutional neural networks are trained to predict locations where conflict is likely to result in fatalities for one year. Second, building on the findings in chapter 1, this dissertation explores the potential to extend predictions to a time series using both yearly and six month intervals. Finally, chapter 3 introduces GeoQuery, a dynamic web application which utilizes a High Performance Computing cluster and novel parallel geospatial data processing methods to overcome challenges associated with integrating, and distributing geospatial data within research communities.