A Dynamic Model of Human Populations

By Joshua Choi

TJHSST Computer Systems Lab 2007-2008

Abstract

The world is becoming better interconnected. As more and more people in developing countries seek to live in economically secure ones, less and less people stay in their own. This constantly changing flux of movement highlights just how important understanding the dynamics of human population is. This project attempts to analyze and understand the growths of a population and the migrations of people across the world. Through understanding how human populations develop, we can predict changes in the future.

Introduction

The human population of the world is now at 6 billion and counting. It is constantly growing, constantly moving. To even try to use human power to analyze all of this data would require thousands of people and thousands of hours of man power to complete. By using computers, we can drastically cut down on the man power needed.

This project can be useful for a great variety of problems. Most prominently, the US takes a census report every ten years. But every decade in between, the census department uses the data gathered to estimate population values. A dynamic model such as the one this project would achieve would be invaluable in assisting their efforts.
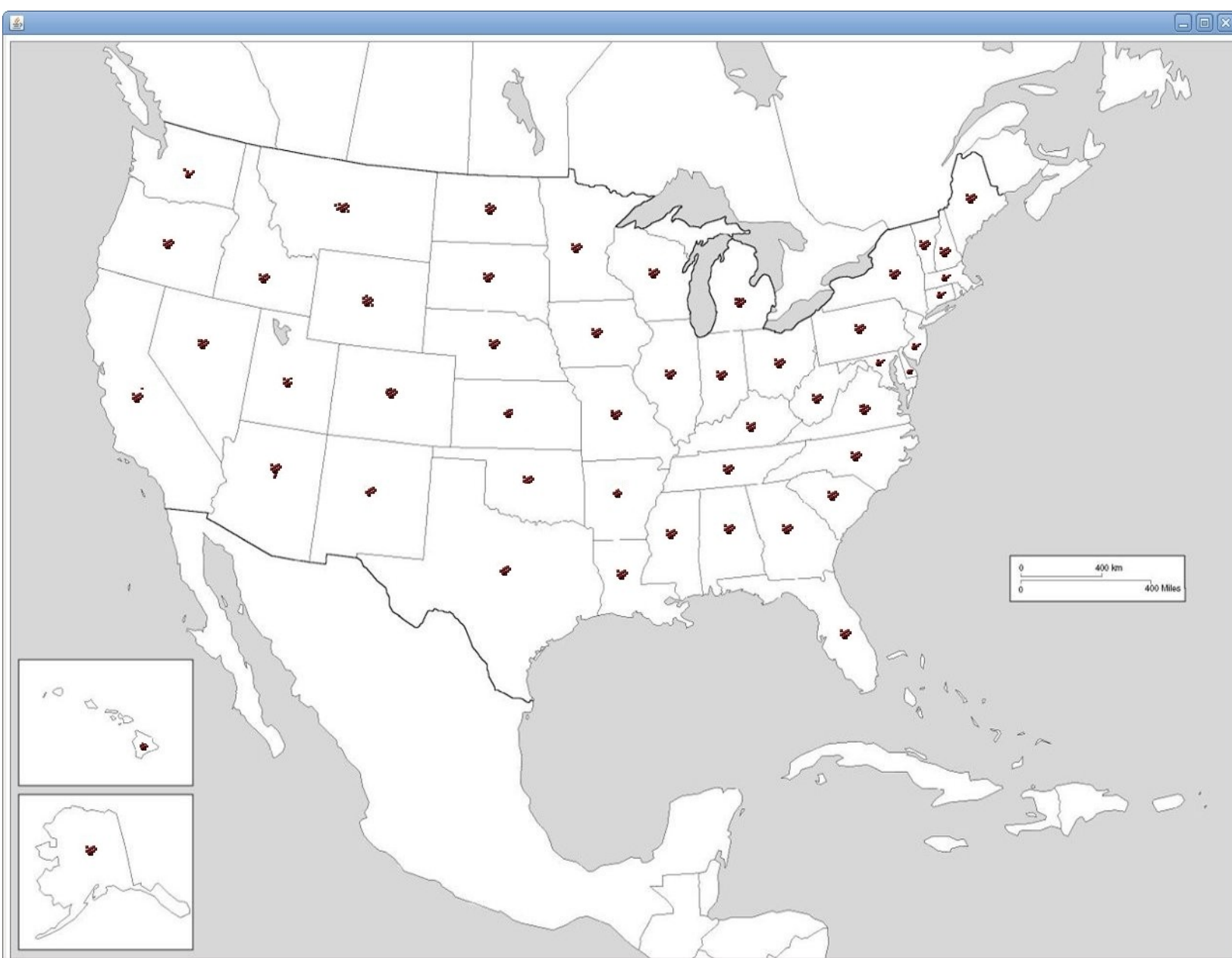
Background

"Surface modelling of human population distribution in China" - They split the population into units of grid-like nature. They analyze this data in order to create two concurring predictions for 2015 under different assumptions.

"Human Population Dynamics Revisited with the Logistic Model: How Much Can Be Modeled and Predicted?" - The researchers attempt to analyze the problems and reliabilities of logistics curves use to model and predict human populations.

"A Stochastic Population Model Related to Human Populations" - Uses probabilistic factors in order to predict population data. They take into account factors of marriage, age, sex, and migrations.

Procedure

This project works by calculating a population growth rate value using population data for a certain group. First, it starts from the states level. The growth rate is calculated for historically rich states such as Virginia and New York. Then, it moves on to the entire US, in which it obtains the growth rate for each and every state. It takes those rates, displays a graphical representation of the growing population with it, and calculates the growth rate of population for the entire country. Finally, it moves on to the population of the entire world, including this time, the immigration and emigration of people. At this level, it calculates the world's growth level, and shows its corresponding graphical representation.

Expected Results

I expect my project to currently be able to correctly predict future population values. It should also be able to display the value graphically, showing an animated change over time.