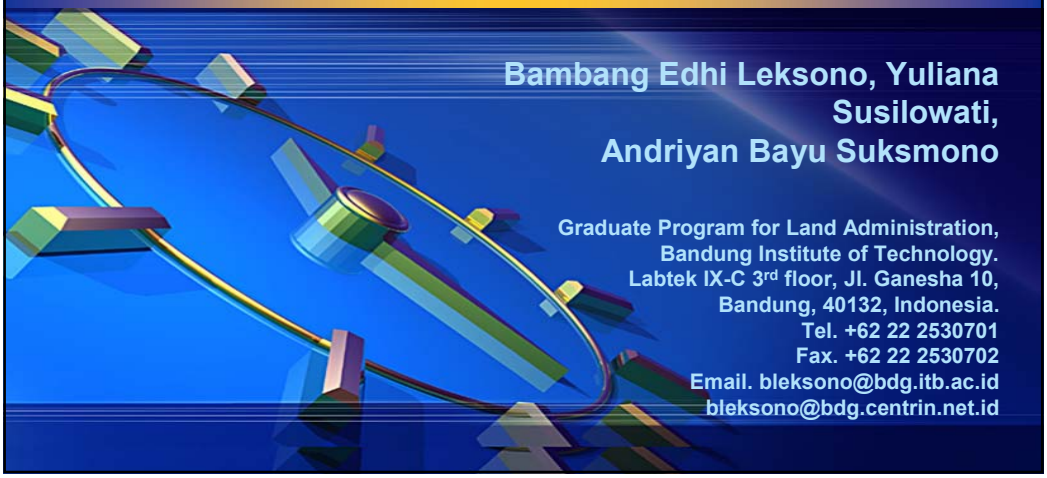
Automatic Land Parcel Valuation to Support the Land and Buildings Tax Information System by Developing the Open Source Software



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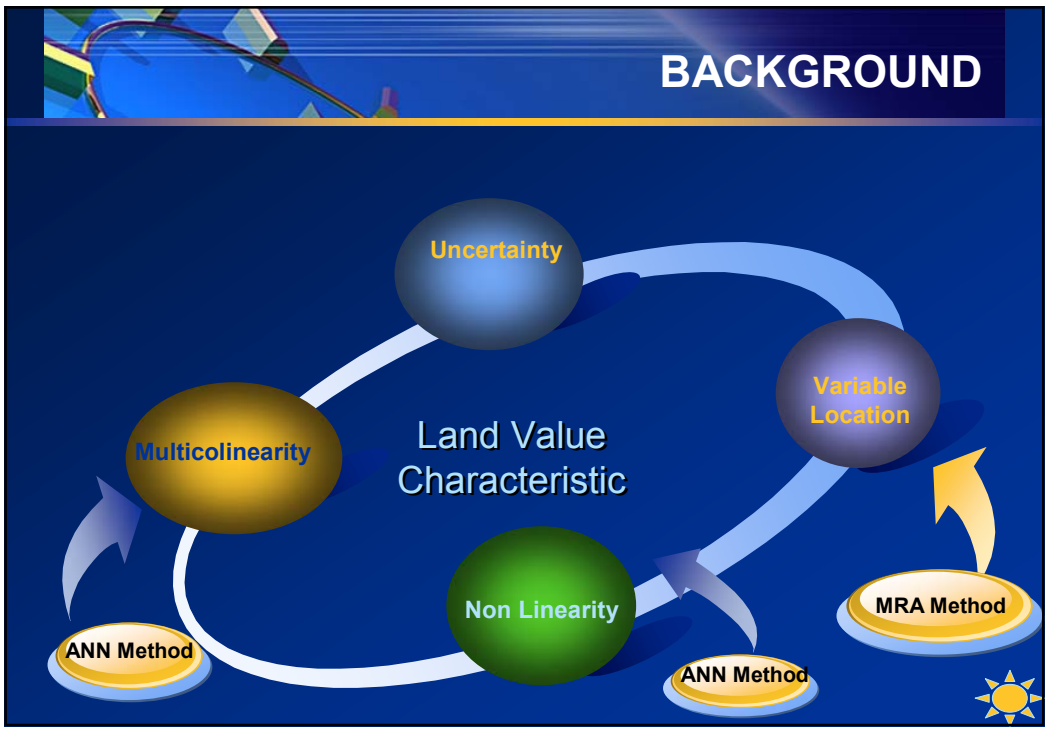
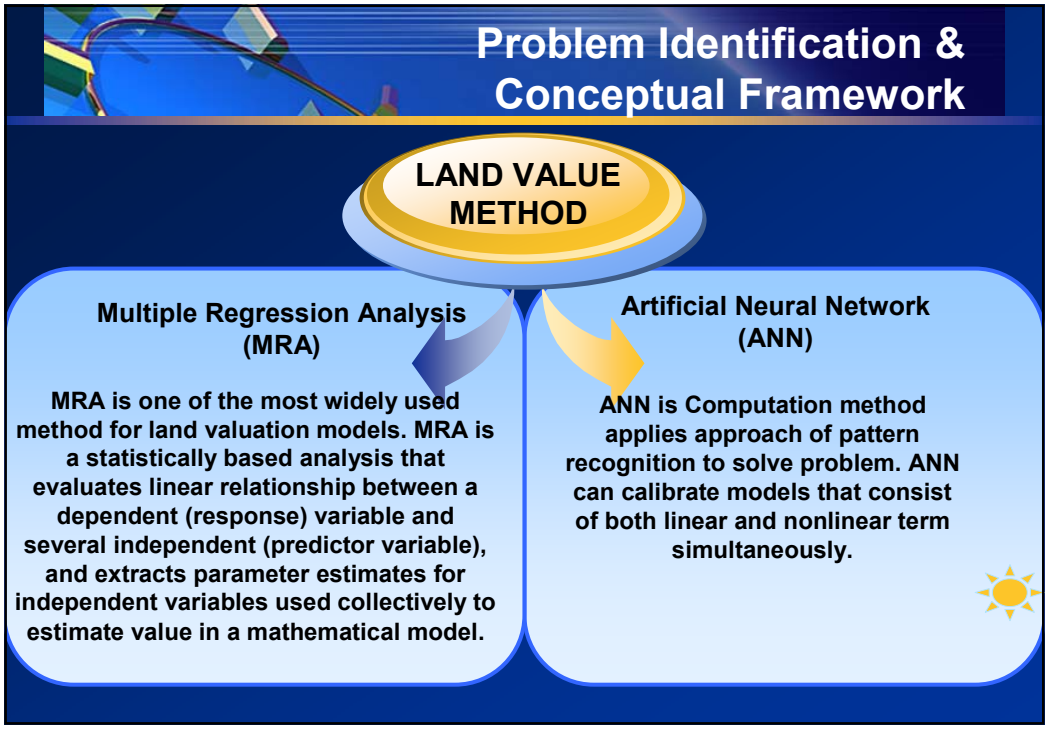
AUTOMATIC LAND PARCEL VALUATION

The purpose of Land Valuation:

Provide a credible and realiable and cost-effective estimate of land value as of given point in time


BACKGROUND
Uncertainty
Variable Location
Multicolinearity
Land Value Characteristic
Non Linearity
MRA Method
ANN Method
ANN Method


Problem Identification & Conceptual Framework
LAND VALUE METHOD
Multiple Regression Analysis (MRA)
MRA is one of the most widely used method for land valuation models. MRA is a statistically based analysis that evaluates linear relationship between a dependent (response) variable and several independent (predictor variable), and extracts parameter estimates for independent variables used collectively to estimate value in a mathematical model.
Artificial Neural Network (ANN)
ANN is Computation method applies approach of pattern recognition to solve problem. ANN can calibrate models that consist of both linear and nonlinear term simultaneously.

RESEARCH QUESTION

1. What is the most significant Variabel of the Land Value system?
2. What is the most proper model of the Land Value system?
3. How is the result of MRA method compare with the ANN Method?

OBJECTIVES

Objective

The aim of this study is to develop the automatic land valuation method using spatial analysis and artificial neural network.

METHOD

LAND VALUE METHOD

Multiple Regression Analysis (MRA)

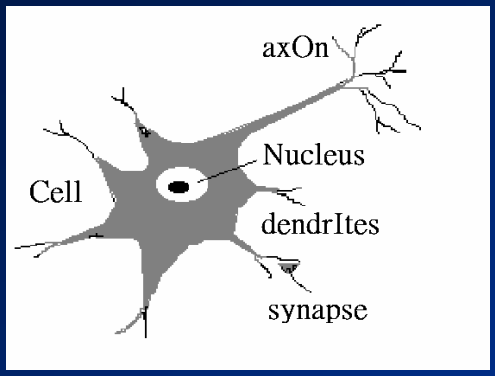
Case Study analysis in using MRA Method

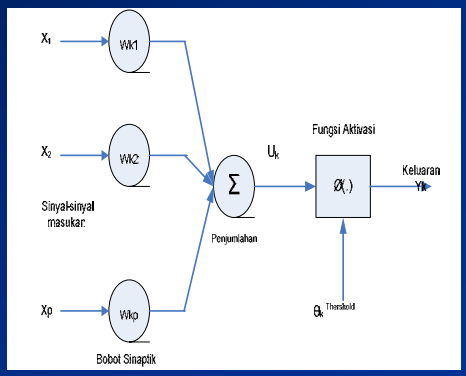
Artificial Neural Network (ANN)

Case Study analysis in using ANN Method

Comparison between of the result of MRA Method and ANN Method

Artificial Neural Network Method



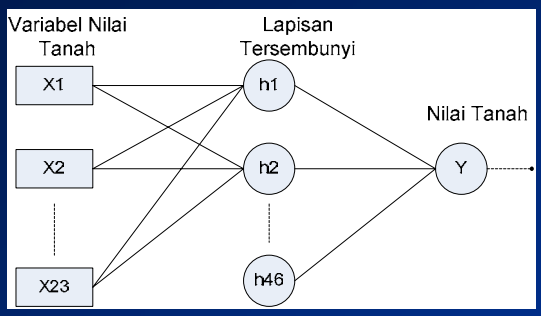


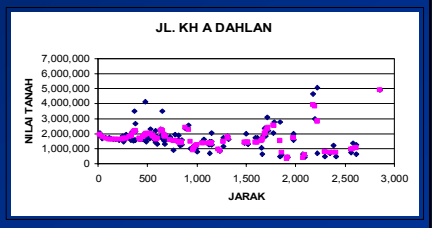
Computational process

Mathematical Model

$Y = f(X) = v1\ X\text{-}1 + v2\ X\text{-}2 + v3\ X\text{-}3 + \ ... \ + v23\ X\text{-}23 + bj$

Architecture of Artificial Neural Network



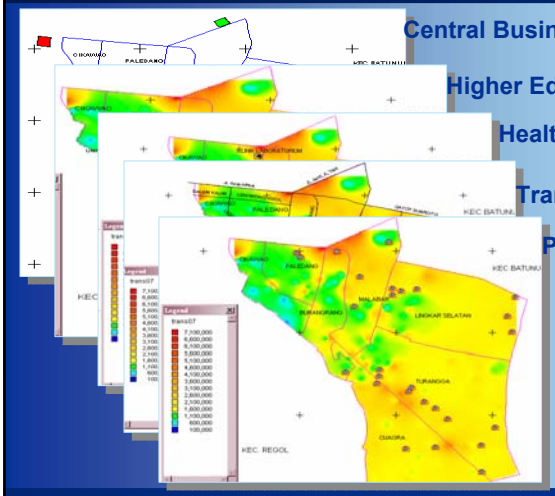


Mathematical Model:

$Hj = f(X) = v1\ X\text{-}1 + v2\ X\text{-}2 + v3\ X\text{-}3 + \ ...\ + v23\ X\text{-}23 + bj$

$Y = g(H) = g(f(X)) = w1\ H\text{-}1 + w2\ H\text{-}2 + w3\ H3 + \ ...\ + w46\ H\text{-}46 + bk$

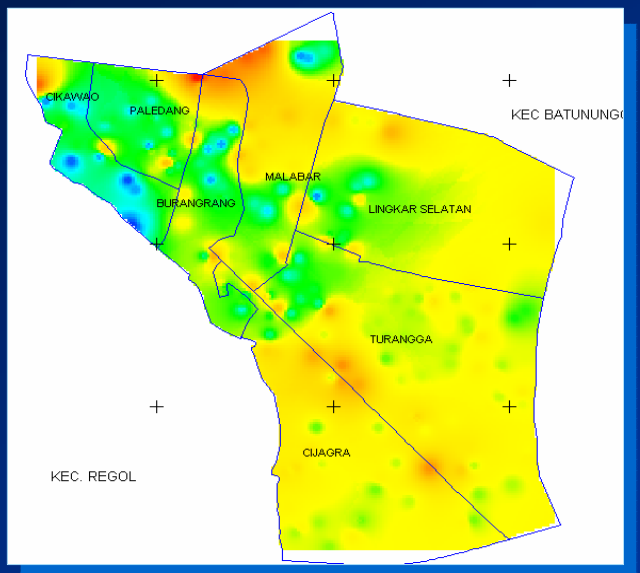
LAND VALUE VARIABLES



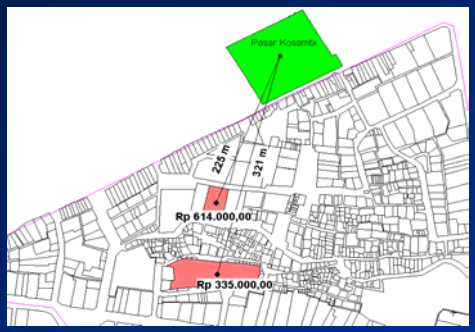
- Central Business District
- Higher Education Facility
- Health Care Facility
- Transportation Facility
- Public School Facility

Land Value

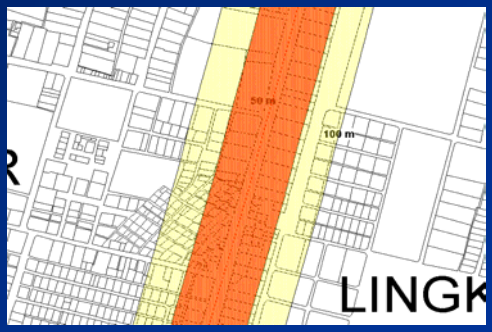
SPATIAL DATA OF LAND VALUE YEAR 2007



VARIABLES MEASUREMENT

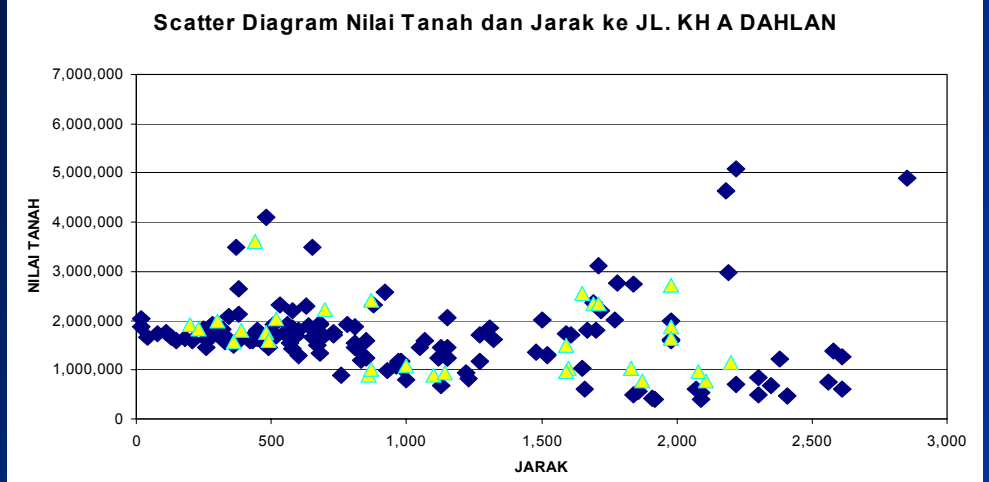


Direct Measurement of Centroid

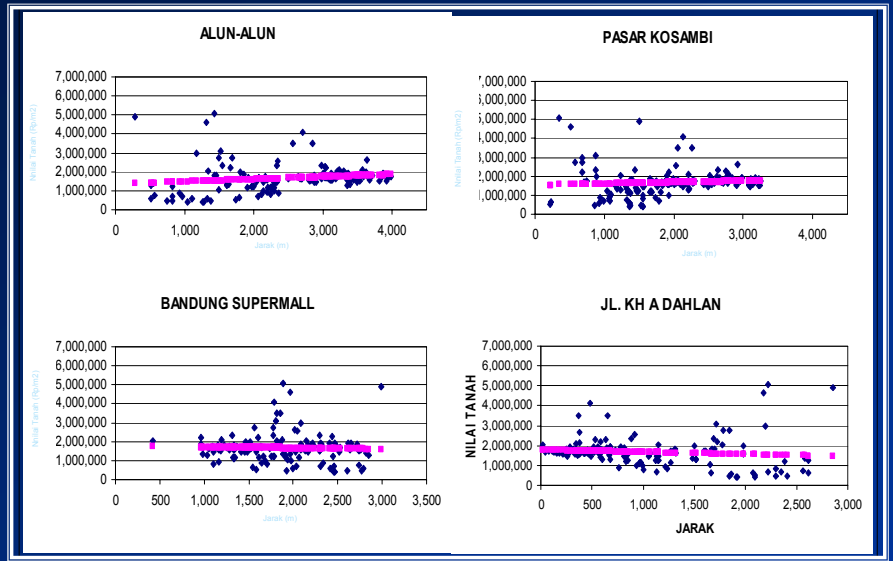


Measurement of Buffer

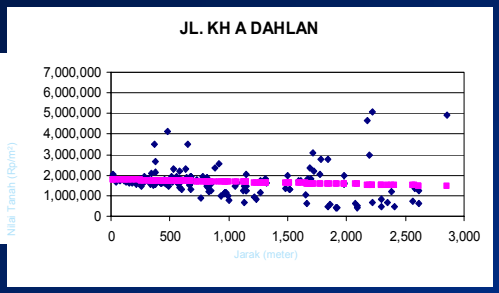
Characteristic of Transportation Facility to the Land Value



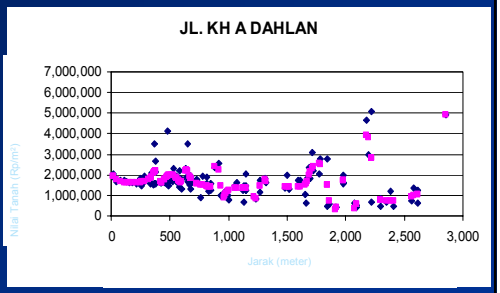
Characteristic of Central Business Distric to the Land Value



COMPARISON OF MRA AND ANN METHOD

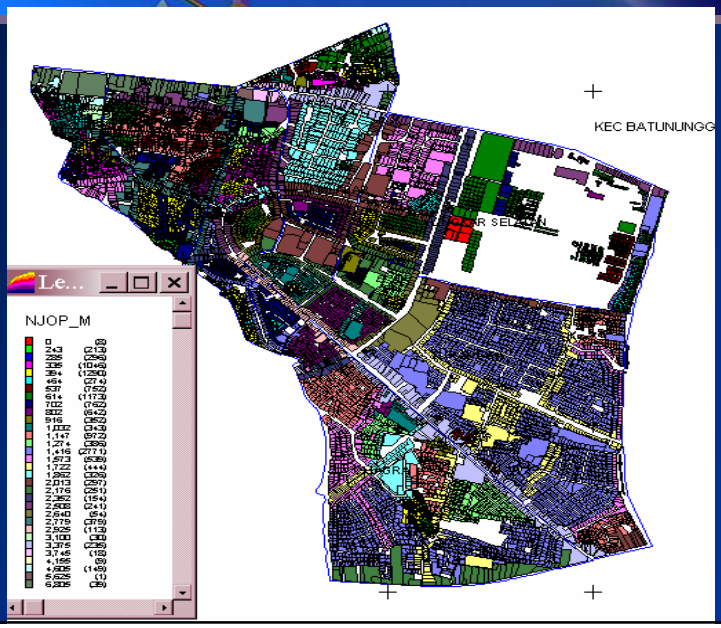


Multiple Regression Analysis (MRA)

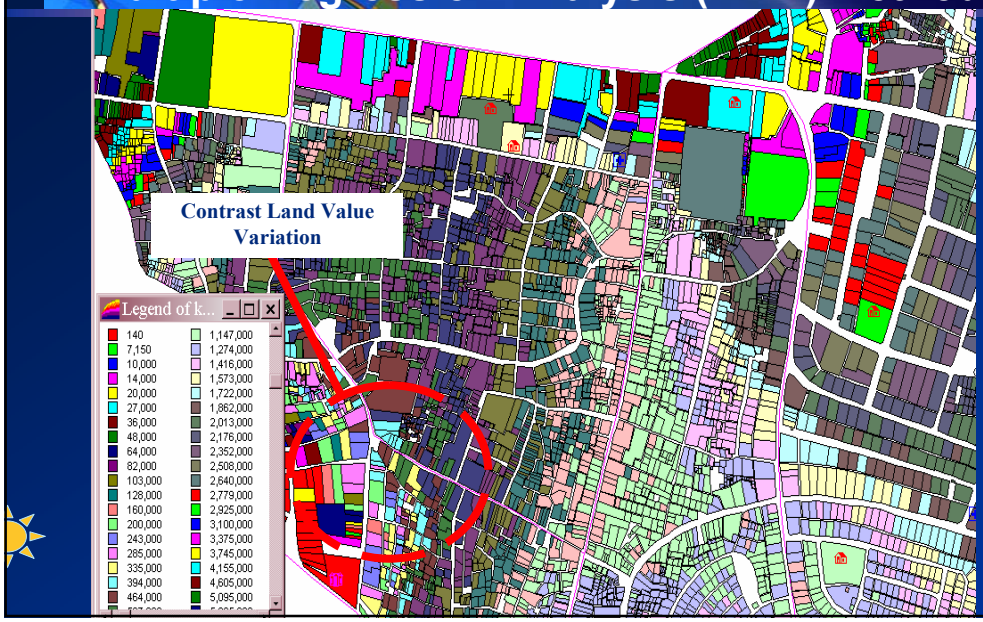


Artificial Neural Network (ANN)

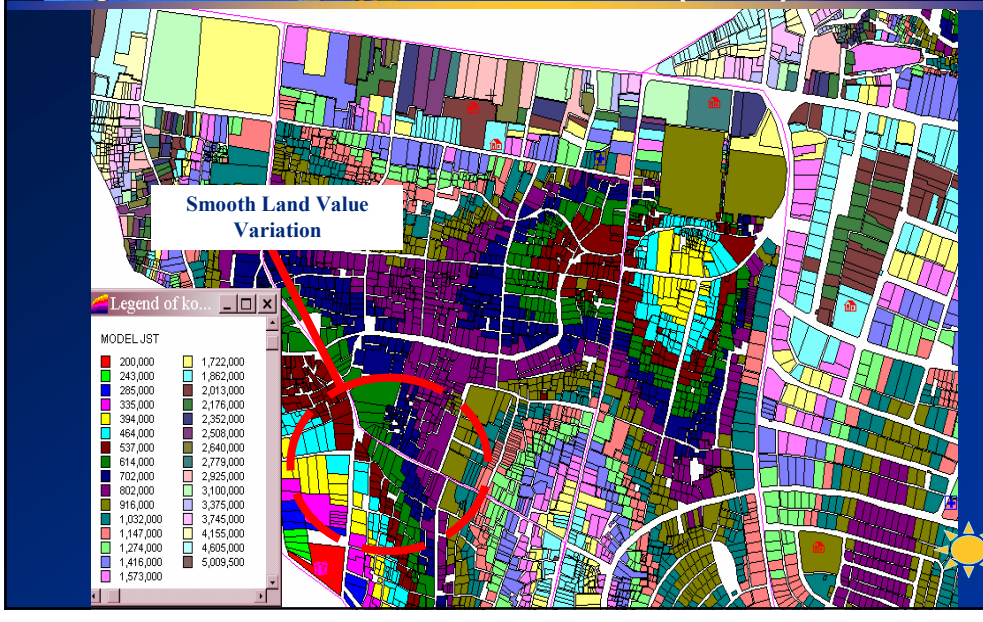
LAND VALUE DATA YEAR 2006



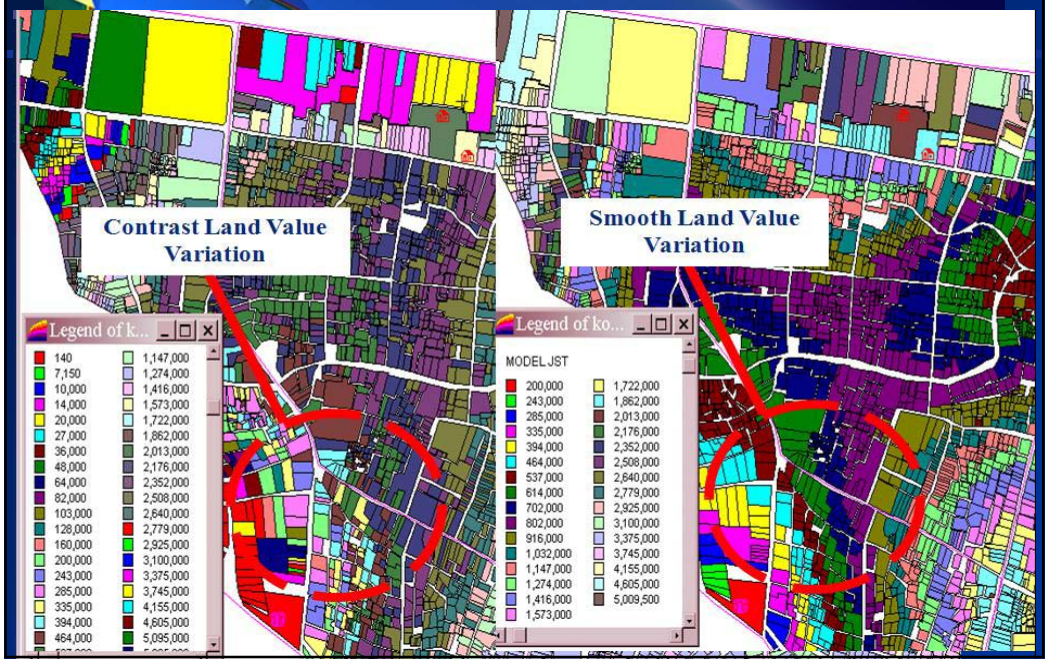
LAND VALUE MODEL
Multiple Regression Analysis (MRA) Method



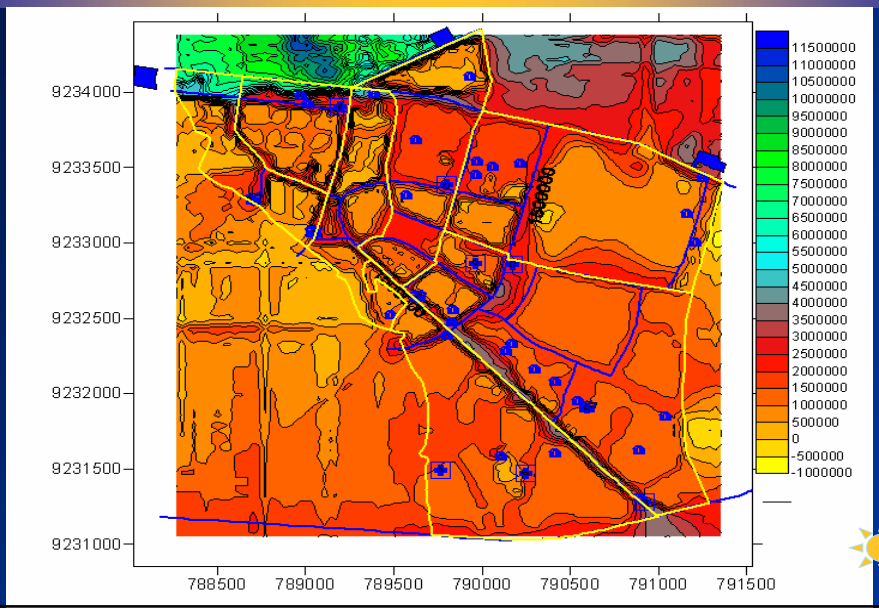
LAND VALUE MODEL
Artificial Neural Network (ANN) Method



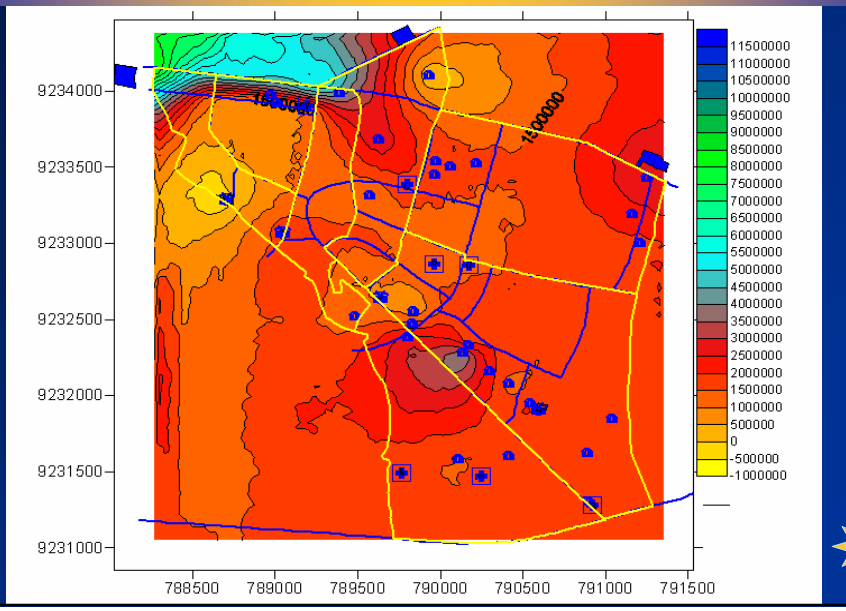
COMAPRISON OF THE RESULT



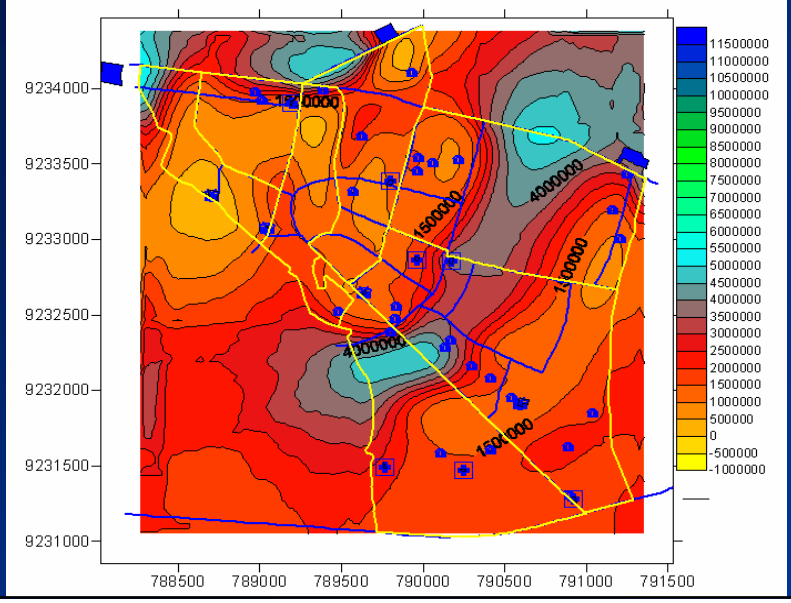
SPATIAL INTERPOLATION OF LAND VALUE DATA YEAR 2006



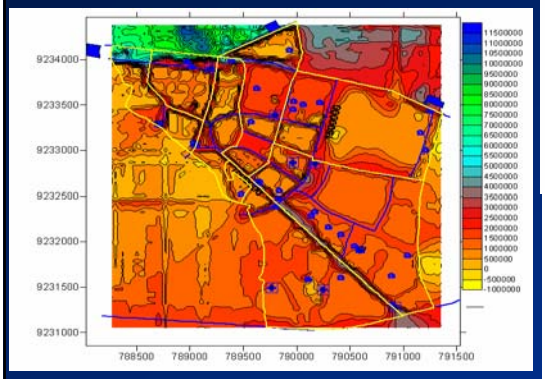
SPATIAL INTERPOLATION OF LAND VALUE MODEL
Multiple Regression Analysis (MRA) Method

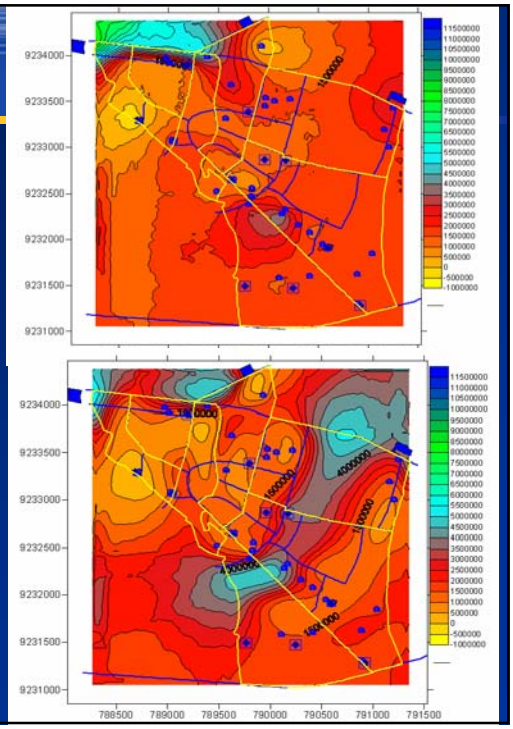


SPATIAL INTERPOLATION OFLAND VALUE MODEL
Artificial Neural Network (ANN) Method



COMAPRISON OF THE RESULT





CONCLUSSION

- Multiple regression analysis (MRA) is the most widely used method for calibrating model. The used of MRA has been the long standing choice for calibration of land value model. MRA is a statistically based analysis that evaluates linear relationship between a dependent (response) variable and several independent (predictor variable), and extracts parameter estimates for independent variables used collectively to estimate value in a mathematical model.

- Artificial neural network can calibrate models that consist of both linear and nonlinear term simultaneously.

CONCLUSSION

- LINEARITY ASSUMPTION CANNOT BE SUPPORTED BY THE LAND VALUE VARIABLES
- THE USE OF NONLINEAR METHOD IS RECOMMENDED FOR THE LAND VALUE MODELING
- The land value modeling using spatial analysis and artificial neural network is a promising method for the automatic land valuation activities.

THANK YOU