SCS-010-005

Comparing the Performance of Wearing Helmet Behavior Model While Driving Motorcycle by Binary Logistic Regression Analysis Method and Learning Vector Quantization of Artificial Neural Network

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Presentation Outline

1. Problem Statements
2. Research Objectives
3. Research Methodology
4. Conclusion
5. Advantages and limitations

Problem Statements

Source : Prof. Pichai Taneranonon

Research Objectives

- Develop Wearing Helmet Behavior Model
- Develop forecasting models
- Comparing the Performance of Model

MODEL

Binary Regression Analysis

SPSS

Artificial Neuron Network

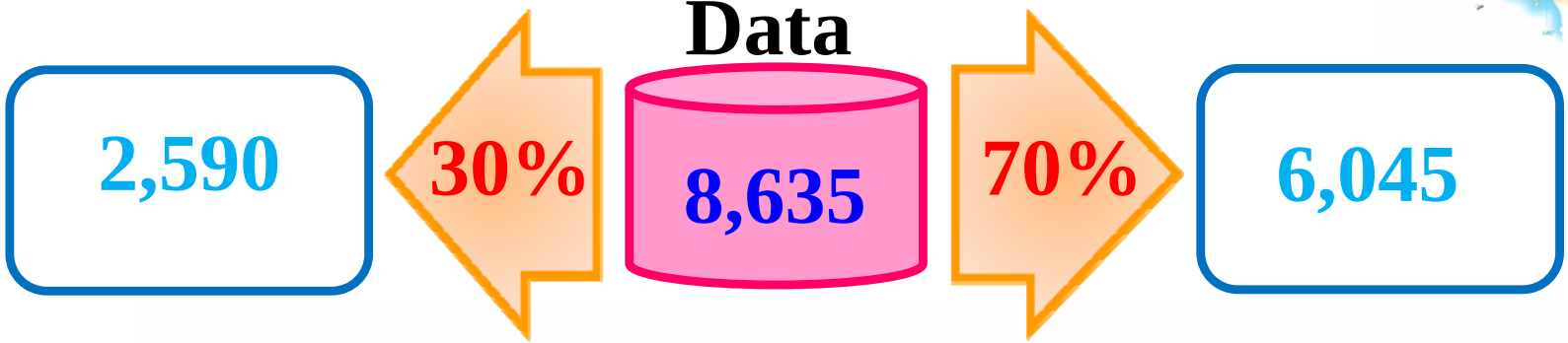
MATLAB

Research Methodology

- **Data – Questionnaire**

  "Awareness campaigns on traffic accidents, knowledge, attitude and acceptance of traffic law enforcement"

- 8,635 Data from Random Sampling 26 Provinces
- Scope Area in Thailand



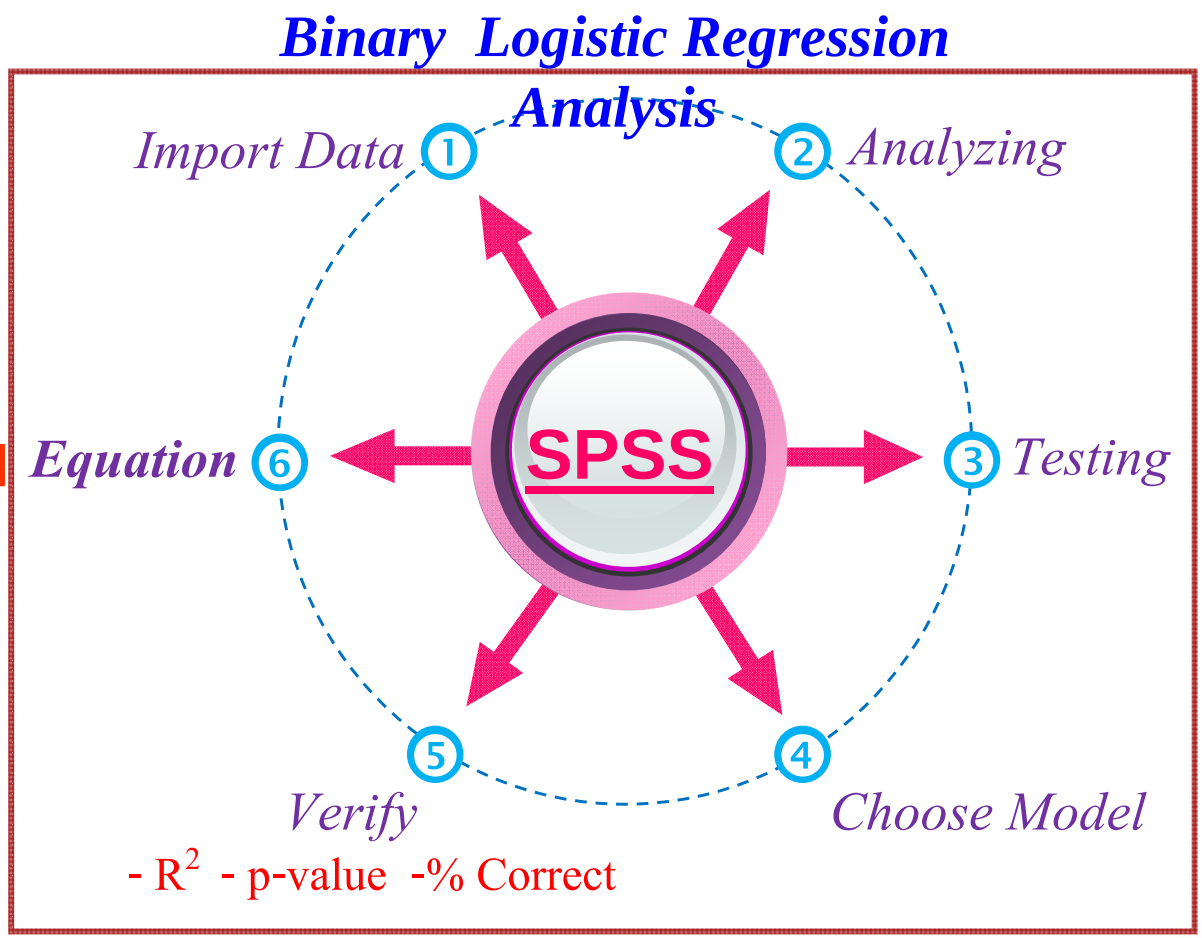
Binary Logistic Regression Analysis

- 2,590 Questionnaire Data → SPSS Analysis
  - Check correction
  - Prepare Data to SPSS Analysis
  - SPSS Program →

$$Y = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n + \varepsilon$$

Y = Motorcyclist helmet-wearing behavior

- 0 Sometimes
- 1 Always



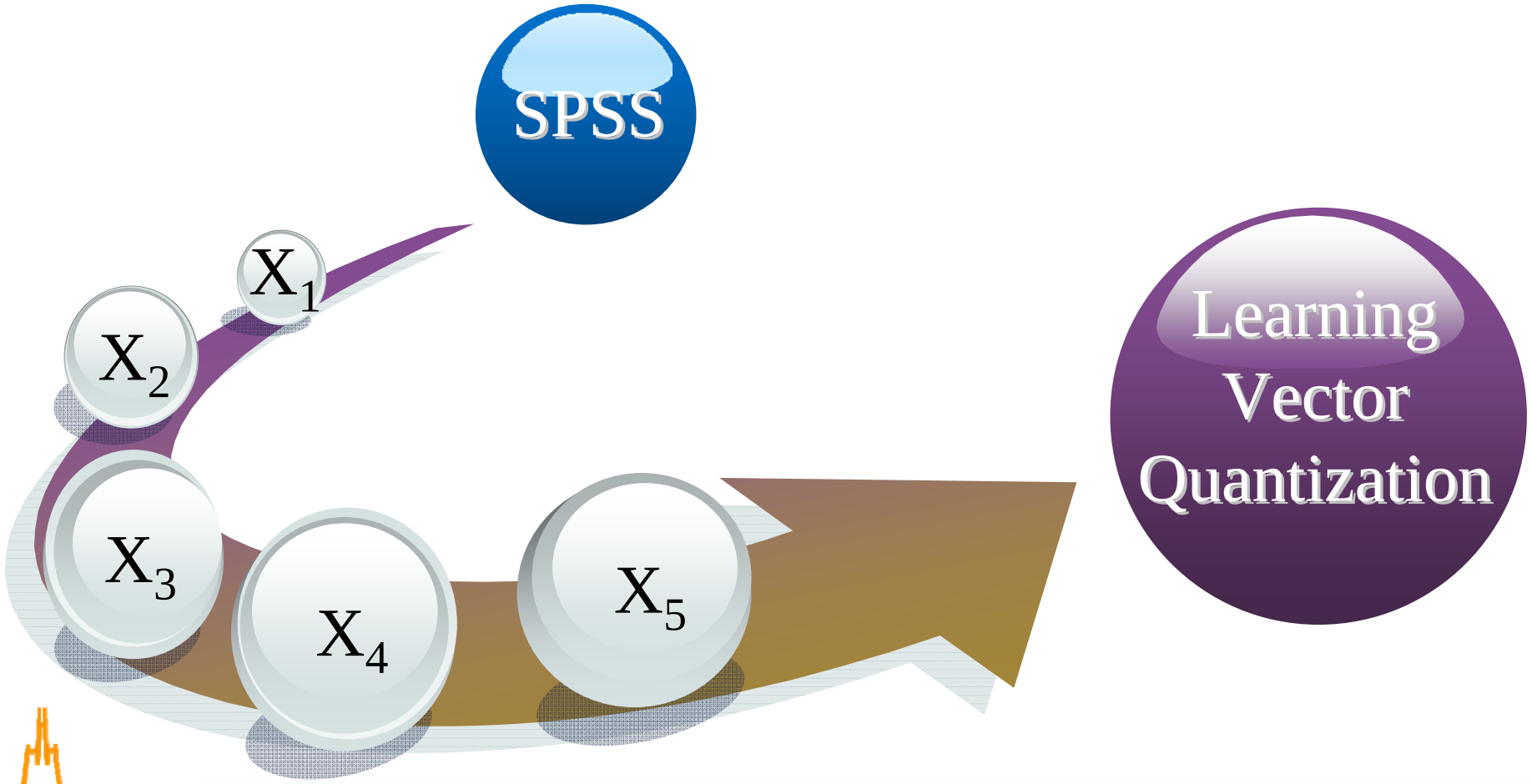
Result of Binary Logistic Regression Analysis

$$Y = -1.036 - 1.080x_1 + 1.964x_2 - 0.404x_3 + 0.245x_4 + 0.431x_5$$

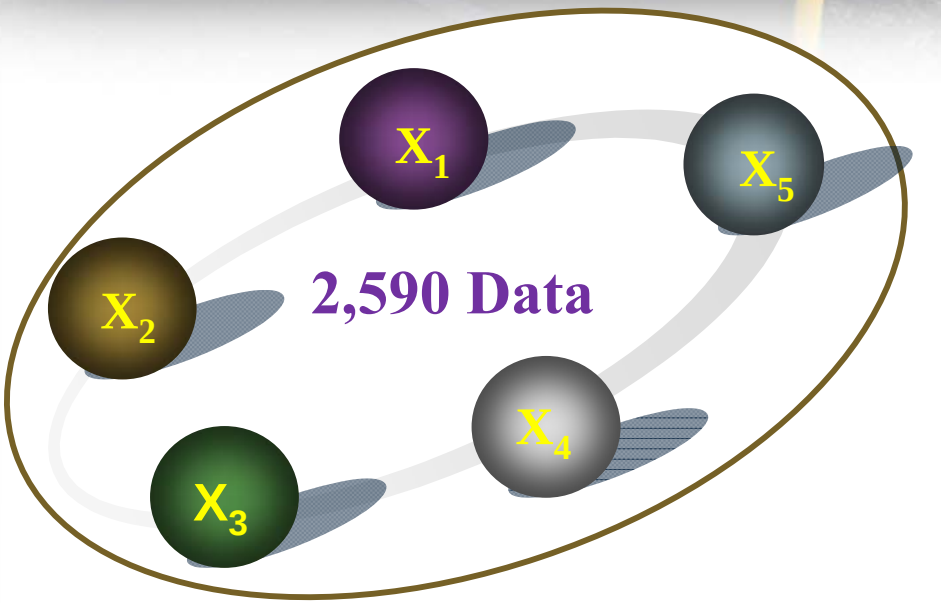
- Y = Motorcyclist helmet-wearing behavior(sometimes/always)
- X_1 = Awareness of traffic accident campaigns
- X_2 = Acceptance of traffic laws
- X_3 = Sex
- X_4 = Age
- X_5 = Level of knowledge of traffic laws.

R Square= 0.254, Percentage Correct = 71.35%

Artificial Neural Network



Learning Vector Quantization (LVQ)



Dummy Variables

0

1

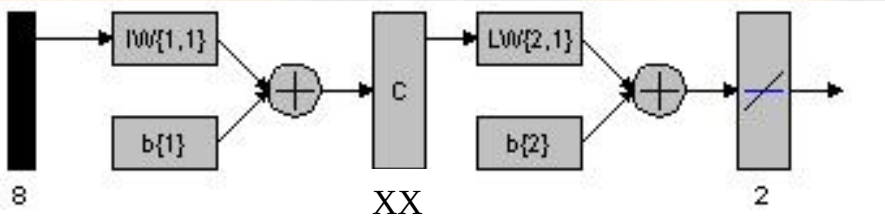
Y	=	Motorcyclist helmet-wearing behavior(sometimes/always)
X_1	=	Awareness of traffic accident campaigns
X_2	=	Acceptance of traffic laws
X_3	=	Sex
X_4	=	Age
X_5	=	Level of knowledge of traffic laws.

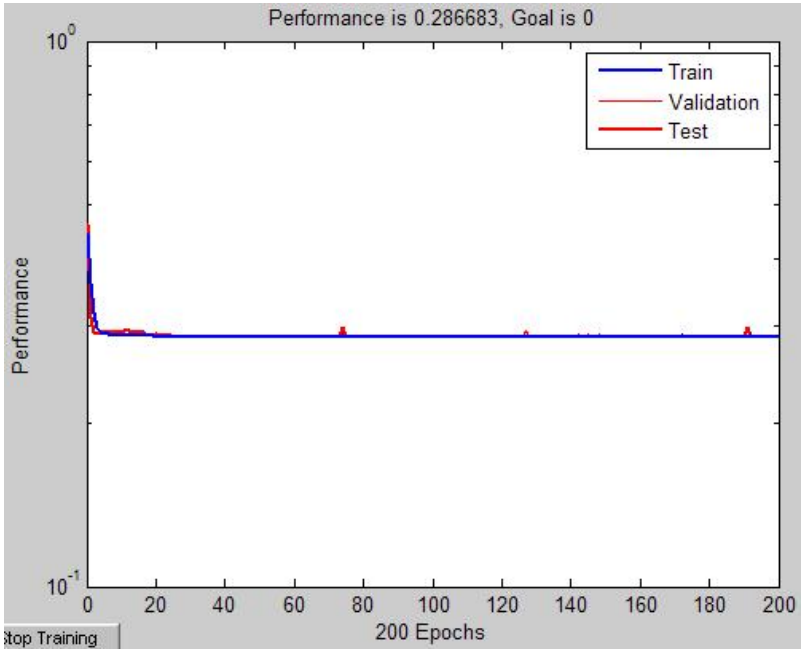
Result of Learning Vector Quantization

Percentage Correct = 71.24%

Network Architecture	Epochs	Training (MSE)	Testing (MSE)	% Correct
8-10-2	20	0.2873	0.2919	70.81%
8-10-2	50	0.2868	0.2876	71.24%
8-10-2	70	0.2873	0.2876	71.24%
8-10-2	100	0.2868	0.2876	71.24%
8-10-2	200	0.2868	0.2876	71.24%
8-20-2	20	0.2870	0.2876	71.24%
8-20-2	50	0.2863	0.2876	71.24%
8-20-2	70	0.2868	0.2876	71.24%
8-20-2	100	0.2868	0.2876	71.24%
8-20-2	200	0.2868	0.2876	71.24%

Results of Accuracy Estimation on Factors Influencing Model Using Artificial Neural Network Method





Graph showing Result of Effectiveness Test from LVQ Artificial Neural Network

Conclusion

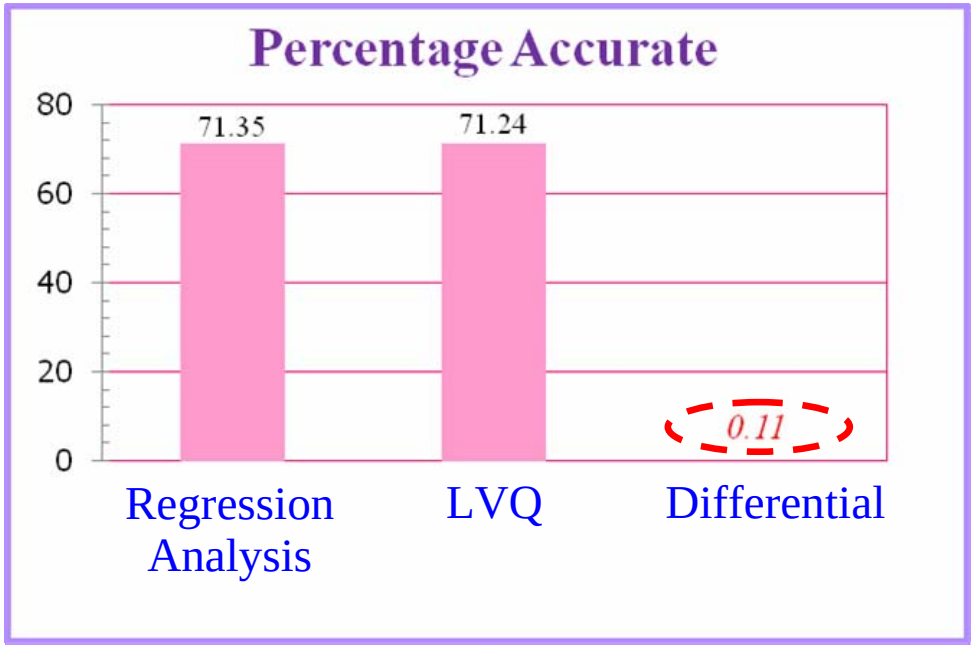
Percentage Accuracy

71.35%

Binary Logistic Regression Analysis

71.24%

LVQ



Advantages & Limitations

1

- Generated a utility function
- The results were merely prediction on each individual(Probability)

Binary Logistic Regression

2

- Not explain significance
- Clearly classified each individual's decision
- Learn and remember

LVQ

Thank You !

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