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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2. Research Objectives
3. Research Methodology
4. Conclusion
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Problem Statements

Source: Prof. Pichai Tanerananon

INSTITUTE OF TRANSPORTATION ENGINEERING
Research Objectives

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

Binary Regression Analysis
Artificial Neuron Network

SPSS
MATLAB
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

![Diagram showing data distribution: 2,590 (30%), 8,635 (70%), 6,045]
2,590 Questionnaire Data Analysis

- Check correction
- Prepare Data to SPSS Analysis
- SPSS Program

\[ Y = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n + \varepsilon \]

\[ Y = \text{Motorcyclist helmet-wearing behavior} \]

0 Sometimes
1 Always

SPSS - R² - p-value - % Correct

Choose Model

Testing

Analyzing

Import Data

Binary Logistic Regression Analysis
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

SPSS
Learning Vector Quantization (LVQ)

2,590 Data

Mock Variable

\[ Y = \text{Motorcyclist helmet-wearing behavior (sometimes/always)} \]
\[ X_1 = \text{Awareness of traffic accident campaigns} \]
\[ X_2 = \text{Acceptance of traffic laws} \]
\[ X_3 = \text{Sex} \]
\[ X_4 = \text{Age} \]
\[ X_5 = \text{Level of knowledge of traffic laws.} \]
<table>
<thead>
<tr>
<th>Network Architecture</th>
<th>Epochs</th>
<th>Training (MSE)</th>
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</table>

Percentage Correct = 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

Binary Logistic Regression Analysis

71.35%  Percentage Accuracy  71.24%

Regression Analysis  LVQ

Percentage Accurate

<table>
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<th>Method</th>
<th>Accuracy</th>
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<tr>
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<tr>
<td>LVQ</td>
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<td>Differential</td>
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Binary Logistic Regression

1. Generated a utility function
2. The results were merely prediction on each individual (Probability)

Advantages & Limitations

1. Not explain significance
2. Clearly classified each individual’s decision
3. Learn and remember

LVQ
Thank You!

Transportation Engineering
Suranaree University of Technology