

PREDICTIVE MODELING ON TELEKOM MALAYSIA DIRECT EXCHANGE LINE GROWTH

**A thesis submitted to the Graduate Study Centre in partial
fulfillment of the requirements for the degree
Master of Science (Intelligent System)**

Universiti Utara Malaysia

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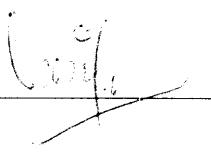
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DIRECT EXCHANGE LINE GROWTH**

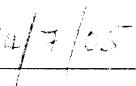
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ABSTRAK

(Bahasa Melayu)

Perlombongan data merujuk kepada pengekstrakan maklumat-maklumat peramalan yang tersembunyi di dalam pangkalan data dan telah menjadi salah satu teknologi penting yang berpotensi untuk membantu syarikat memfokuskan kepada maklumat-maklumat penting di dalam gudang data mereka. Model peramalan menjadikan peramalan tentang nilai-nilai data berdasarkan kepada maklumat-maklumat atau hasil-hasil telah diperolehi daripada data-data terdahulu di mana kemungkinan hasil yang terbaik adalah berdasarkan kepada perolehan data sebelumnya. Telekom Malaysia (TM) adalah merupakan pelopor kepada era telekomunikasi di Malaysia yang telah membekalkan kemudahan-kemudahan komunikasi dan juga bertindak sebagai tulang belakang digital. Talian Ibusawat Terus (*Direct Exchange Line – DEL*) adalah salah satu kemudahan telefoni utama di TM yang mengendalikan sejumlah besar dan pelbagai jenis data di dalam operasi hariannya. Oleh itu, amat sukar untuk menyerlahkan struktur-struktur pengetahuan yang dapat membantu dalam pembuatan pemutusan terutamanya dalam keadaan kebarangkalian yang begitu terhad. Matlamat utama tesis ini adalah untuk mengenalpasti teknik perlombongan data yang paling sesuai di antara regresi logistik (*logistic regression*), pohon keputusan (*decision tree*) dan rangkaian neural (*neural networks*) untuk meramal peningkatan dan perkembangan DEL berdasarkan kepada lima attribut-attribut fizikal penting yang terdiri daripada ibusawat, pelanggan, pemasangan baru, pemotongan, dan ketersediaan kabel atau port (ECP) yang menyumbang kepada 672 rekod yang mensasar kepada samada berlaku peningkatan atau penurunan dalam perkembangan DEL di TM khususnya di Pulau Pinang. Keputusan daripada peramalan ini amat penting untuk mendapatkan pemahaman yang lebih mendalam tentang masa hadapan pasaran berdasarkan kepada situasi semasa dan terdahulu.

ABSTRACT

(English)

Data mining (DM) is the extraction of hidden predictive information from large databases that has become a powerful new technology with great potential to help companies focus on the most important information in their data warehouses. A predictive model makes a prediction about values of data using known results found from historical data where the best possible outcome based on the previous data is derived. Telekom Malaysia (TM) is Malaysia's premier communications provider that provides the digital backbone and communication facilities. Direct Exchange Line (DEL) is one of its core telephony services that handle massive volume and variety of data in its daily operations. Therefore, it is hard to reveal knowledge structures that can guide decisions in conditions of limited certainty. The main objective of this study is to identify the most appropriate DM technique between logistic regression, decision tree and neural networks for predicting DEL growth based on five physical attributes namely exchanges, subscribers, new installation, cutting, and availability of cable or ports (ECP) that constitute of 672 instances leading to a target (either increase or decrease). The result of this study is important in assisting the prediction of DEL growth in TM specifically in Penang, thus leading on better understanding on the future of the market based on the current and previous situation.

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LIST OF ABBREVIATIONS

Acronym	Meaning
AI	Artificial Intelligence
AIM	Air Itam
BF	Batu Ferringhi
BI	Balik Pulau
BM	Bukit Mertajam
BMU	Batu Maung
BP	Backpropagation
BTH	Bukit Tengah
BW	Butterworth
BYB	Bayan Baru
CRISP-DM	Cross-Industry Standard Process for Data Mining
DM	Data Mining
DT	Decision Tree
ECP	Availability of Cables or Ports
EDA	Exploratory Data Analysis
GEEs	Generalized Estimating Equations
GLR	Gelugor
GPA	Grade Point Averages
GPU	Guar Perahu
HU	Hidden Units

JTG	Jelutong
KBS	Kepala Batas
KMR	Komtar
LR	Logistic Regression
LRate	Learning Rate
MGB	Machang Bubok
MLP	Multi-Layer Perceptron
MR	Momentum Rate
NN	Neural Networks
NT	Nibong Tebal
PG	Penang
SGD	Sungai Dua
SI	Sungai Bakap
SJA	Seberang Jaya
SZ	Simpang Ampat
TAT	Telok Air Tawar
Telco	Telecom Company
TGR	Tasek Gelugor
TJB	Tanjung Bungah
TKR	Telok Kumbar
TM	Telekom Malaysia

CHAPTER ONE

INTRODUCTION

The fierce nature of today's competitive landscape has forced organizations to operate more efficiently, not just on a day-to-day basis but also in planning for the future, thus competitive advantage requires more than estimates and educated guesses. To succeed and grow, organizations need an accurate picture of the future and the ability to reliably measure the impact of economic and marketplace factors. Strategic business planning requires the ability to model and simulate any business process and the factors that has an impact on those processes, no matter how complex it is.

Telekom Malaysia, hereafter called TM is Malaysia's premier communications provider, providing the digital backbone and communication facilities so essential in propelling Malaysia forward towards a first world environment. As Malaysia's only full service telecom company (telco), TM offers a comprehensive range of communication solutions in Direct Exchange Line (DEL), voice telephony, mobile, high speed broadband and internet services, multimedia applications, data services, broadcasting, audio and video conferencing and consultancy, thus TM already collects and refines massive quantities of data in its daily operations. Therefore, it is hard to reveal knowledge structures that can guide decisions in conditions of limited certainty.

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