

TIME SERIES FORECASTING COMPETITION AMONG THREE
SOPHISTICATED PARADIGMS

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TABLE OF CONTENTS

ABSTRACT	iii
DEDICATION	iv
LIST OF TABLES	v
LIST OF FIGURES	vi
1. INTRODUCTION	1
1.1 Forecasting.....	1
1.2 The M3 Competition and Discussion.....	2
1.3 The M3 Data.....	4
1.4 Forecasting Approach.....	5
1.5 Forecast Accuracy Measures	7
2. THE OVERVIEW OF ARIMA	9
2.1 Autoregressive Model	10
2.2 Moving-Average Models.....	11
2.3 ARIMA Models	11
2.4 Akaike Information Criterion (AIC)	12
3. THE OVERVIEW OF BAYESIAN STATISTICS AND DLM.....	13
3.1 Polynomial Model.....	15
3.2 The Dynamic Linear Model.....	16
4. THE OVERVIEW OF ARTIFICIAL NEURAL NETWORKS (ANNs).....	20
4.1 ANNs in Forecasting	21
4.2 Biological Structure.....	22
4.3 Single Network ANNs.....	24
4.4 Network Architecture	25
4.5 Backpropagation Algorithm	27
5. MIXED LINEAR MODEL AND DISCUSSION	38
REFERENCE.....	52
APPENDIX.....	56

ABSTRACT

This paper is focused on assessing the performance of three kinds of forecasting paradigms: Dynamic Linear Models (DLM), Artificial Neural Networks (ANNs) and Autoregressive Integrated Moving Average models (ARIMA) in time series forecasting. We continue the work of Makridakis and Hibon's M-3 forecasting algorithm competition, a large scale project to assess how various forecasting algorithms perform on 3,003 real world time series. Our purpose is to find out how the different types of time series affect the forecast accuracy of these paradigms. In addition, we try to find a guideline about how to select a forecasting model subject to the data characteristics and how to make a model fit the time series data through adjusting the model structure and parameters. Statistics accuracy measures: Symmetric Mean Absolute Percentage Error (SMAPE) and Mixed Linear Model are employed to evaluate and compare the competition results. The results show that: different paradigms perform different based on time series category; statistically sophisticated paradigms, e.g. ANNs, produce better forecast accuracy than simple paradigms in monthly time series; the length of the time series affect the ANNs performance; complex DLM models are not necessarily better than simple DLM models in forecasting. We provide a guide line for selecting a paradigm in forecasting with respect to the time series characteristic and the forecast requirement.

DEDICATION

This thesis is dedicated to my wife Yuan and my newborn baby Anna.

LIST OF TABLES

Table		Page
1.	The classification of the 3003 time series	5
2.	Data detail of all the seasonal catalogs	5
3.	Univariate DLM.....	19
4.	Average Symmetric MAPE: Yearly Data.	44
5.	Results of Mixed Model: Yearly Data	45
6.	Average Symmetric MAPE: Quarterly Data	46
7.	Results of Mixed Model: Quarterly Data	47
8.	Average Symmetric MAPE: Monthly Data	48
9.	Results of Mixed Model: Monthly Data	49
10.	Average Symmetric MAPE: Other Data.....	50
11.	Results of Mixed Model: Other Data.....	51

LIST OF FIGURES

Figure	Page
1. Forecasting Approach	7
2. Three stages model of a ANNs	23
3. Single Network	24
4. Network Architecture	27
5. Gradient Descent Algorithm	29
6. Network Training	32
7. Forecasting	33
8. Elapsed Time and Delay	35
9. Elapsed Time and Network Configuration A	35
10. Elapsed Time and Network Configuration B	36
11. Average SAMPE of Different ANNs Configurations in All Horizon	37