Writing Chapter 1: Introduction

- Overview:
  - Establish a research territory
  - Provide readers with a setting for the problem to be reported
  - Show the research area is important, central, interesting, problematic or relevant in some way
- Background of the Problem
  - Establish a niche for your research
  - More specific statements about the aspects of the problem already studied by other researchers
  - Indicate gaps in previous research

Writing Chapter 1: Introduction…cont

- Statement of a Problem
  - Statement that indicate the need for more investigation
  - Outline where your study will extend current knowledge or research or how it differs from current research
  - Pose research questions to address the problem
- Purpose and Objective
  - Very specific statement about the purpose of the study followed by objectives of the research
- Scope
  - Limits your study within the timeframe

Writing Chapter 1: Introduction…cont

- Methodology
  - Outline the steps you will take to address the broad question
- Importance of the Study
  - Give a value or justification for carrying out the study
- Contribution of the Study
  - Announce the principle finding (contribution)
- Organization of Thesis
  - Indicate the structure of the thesis

Research Significance

- State clearly why this research is important, what the benefits will be and how your work will contribute to knowledge in your field.
  - This may include commercial benefits, changes in current practice, a new perspective on an old issue or other benefits to the community.
- You need to indicate why it is significant and how it advances understanding of the issues under discussion.

Feasibility

- Refers to the extent to which a study may be done practically and successfully
- Researchers must consider:
  - Scope
  - Time
  - Cost
  - Ethical Issues
  - Study participants

Initial Literature Review

- Aids in:
  - Problem selection
  - Understanding if the question has already been answered
  - Identifying conceptual and practical obstacles
  - Learning how to address obstacles
  - Building on existing research

Examples

Problem Statement (1/3)

The important issue in time series forecasting is how to develop a model that can produce accurate forecasting results. However, to achieve this in reality is a big challenge to the academicians and practitioners due to several limitations. Real world time series forecasting problems often complex, and comprise of insufficient, incomplete and uncertainties historical data, influenced by multi and rapidly change factors. Getting information such as the most and the least significant factors that influence the system's performance is very important. However, the relationships among various affecting factors or input data are unclear and difficult to quantify (intangible data) particularly when the information is not clear, incomplete and uncertain. It is also difficult to get the practical and experimental data.

Problem Statement (2/3)

Previous hybrid model (Zhang, 2003) that consists of the traditional linear ARIMA model and nonlinear ANN model could not overcome the above problems. For example, instead of using univariate forecasting model, multivariate forecasting model is required for dealing with multi factors. In previous works, feature selection is not of concern since univariate time series data is used to represent only one feature at a time. Hence, a new hybrid model should be developed to solve the arising problem and able to handle the uncertainties in time series problems.

The best model in the real world forecasting should be one that is robust and accurate so that users have confidence of employing the model repeatedly.

Problem Statement (3/3)

Therefore the problem statement for this research is,

"***A new hybridizing linear and nonlinear model is able to cope with multi factors, insufficient, incomplete and uncertainties time series data for better accuracy, stable system and robust forecasting result***"

Research Questions

i) How to design a new hybrid linear and nonlinear model?

ii) How to find the least and the most significant factors that can affect the forecasting performance? How to find the optimum significant factors that can represent the whole pattern in time series in order to maintain high forecasting accuracy.

iii) How to combine the linear and nonlinear models to minimize the over- fitting problem in order to improve the capability of hybrid forecasting model.

iv) How to minimize the possibility of local minima problems occurred in previous hybrid model?

v) How to obtain accurate and robust forecasting result when dealing with incomplete data and small size of time series data?

vi) Can the proposed hybrid model outperform the individual models and the existing hybrid models?

Aim of the Research

The aim of this research is to develop and enhance hybrid linear-nonlinear model that will improve forecasting performance, able to deal with insufficient and incomplete data. In addition, it can minimize the occurrence of over-fitting and local minima problem.

Objective

i) To propose a new cooperative feature selection scheme that produces the optimum number and significant of input factors.

ii) To develop hybrid nonlinear-linear model with new sequence of hybridization that is able to handle incomplete and various size multivariate time series accurately and robustly.

iii) To investigate the effect of cooperative feature selection, integration of PSO based BP neural network and changing hybrid sequence on time series forecasting performance

iv) To evaluate and validate the performance of the proposed hybrid model with benchmark models on four different set of time series data that consists of different behavior and scale.

Scope

i) Only quantitative forecasting method is employed.

ii) Four different sample sets of multivariate time series data namely China crop yield, KLSE closing price, Composite Index price and Total Export Earnings of natural rubber products are used to validate the performance of our proposed hybrid model.

iii) Since linear model such as ARIMA model need at least 50 data points in order to successfully perform the forecasting task (Kang, 1991; Mehdi et al., 2008), we assume that the sample size less than 50 as a small scale data; whereas the sample size that is equal or greater than 50 as large scale data.

iv) The data are categorized into simple and complex time series.

v) The enhancement of the proposed hybrid model is based on hybrid linear - nonlinear model introduced by Zhang (2003).

vi) ARIMA and ANN are respectively chosen as linear and nonlinear model.

vii) This study uses only nonlinear time series data and excludes nonlinear parameters.

Quality of the Proposed Research

- Show a thorough knowledge of relevant prior research.
- Prior research is related to the proposed research.
- Comprehensiveness and appropriateness of the research design.
- Appropriateness of the instrumentation and methodology.
- Appropriateness of the anticipated analyses.
- The likelihood that the proposed research can be completed successfully as described.

THANK YOU