Master's Thesis Proposal

General Information

Master's Thesis Title:	**Liquidity risk modelling using artificial neural networks**.
Publication Date:	
Expiry Date:	
Modality:	☒ technological project ☒ research work
M.Sc. Th. Advisor:	Salvador Torra Porras, Lluís Belanche Muñoz, Maite López-Sánchez
M.Sc. Th. Advisor's Dept. & University:	LSI(UPC), Economics(UB), MAIA(UB)
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Observations:	
Student's Name: (if already known)	Jordi Petchamé Sala

M.Sc. Thesis Description

Main issues / Brief Description:

The master thesis is focused on a financial field. The aim of the project is the analysis of the liquidity risk forecasting bid-ask values from portfolio of market items. In this project the student will analyze and forecast liquidity risk using existing models of artificial neural networking. The candidate, after identifying the optimal parameters will compare the performance of the different methods. The project is being developed in a narrow collaboration with a business in Barcelona.

Detailed Description:

The motivation of this work lays on the fact that liquidity risk model is present in the need of real world such as it happens changes in market operational conditions as well as the magnitude and nature of financial risk have demanded the writing down and structuring of Basel II Capital accord. Nevertheless, liquidity risk in the markets is currently an interesting and far-reaching. There are new regulations that recommend to investors control. But the methodology for its calculation is not yet fully defined for individual assets. The application with neural networks we propose will be held on the equity market, and will consist of predicting the variable at t +1 (Bid-Ask) of a set of assets in the Spanish market, from a set of independent variable (Volume; Turnover, Capitalization and volatility).

On the other hand, artificial neural networks play an increasing key role in economical/financial prediction where the application of neural networks in time series forecasting is based on the ability of neural networks to approximate nonlinear functions. The most popular treatment of input data is feeding the neural networks with either the data at each observation, or the data from several successive observations. This treatment considers the time series as a nonlinear time series and tends to generate a nonlinear "auto-regression" model to fit the series.

The working plan is the following:

1. Introduction to the problem: study of the related bibliography about liquidity risk, time series, and artificial neural network

2. Analysis of the existent liquidity models.

3. Analysis of some sort of neural networks: for instance: feed-forward multilayer, time delayer or recurrent networks and also support vector machine. Applying suitable neural networks in a multivariate time series domain and comparing theses with classical models.

4. Design, implementation and test of the new routing algorithms which solve the current ailment.

5. Analysis of the results

References:

- Asset Market Liquidity Risk. Management: A Generalized Theoretical Modeling Approach for Trading and Fund Management Portfolios (2009), Al Janabi, Mazin A. M. UAE University

- Time Series Prediction and Neural Networks: R.J.Frank, N.Davey, S.P.Hunt, Department of Computer Science, University of Hertfordshire, Hatfield, UK.

- Predicción De Series Temporales Usando Redes Neuronales: Un Caso De Estudio: Horacio paggi.

- Anàlisi de sèries temporals mitjantçant la predicció amb xarxes neuronals artificials: Esteve Xavier Rifà Ros, Departament de Metodologia de les Ciències del Comportament Universitat de Barcelona

Minimal Requirements & Previous Knowledge:

- Knowledge in time series, liquidity risk modelling and artificial neural networks.

Location and Date: Barcelona,

To the Academic Commission of the Master in Artificial Intelligence (CAIMIA)