

# Weekly Report of Research Work

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## Contents

1	<b>Work</b>	<b>2</b>
2	<b>Question</b>	<b>2</b>
3	<b>The abstract for my graduate paper</b>	<b>2</b>
4	<b>The first Chapter</b>	<b>2</b>
5	<b>The two papers I read this week</b>	<b>3</b>
6	<b>The study on NCSTAR</b>	<b>4</b>

## 1 Work

1. Finishing the Chinese abstract for my graduate paper
2. Reading two papers
3. Updating the forecasting method

## 2 Question

1. There is a paper I need urgently named "Regression neural network for error correction in foreign exchange forecasting and trading", which I have searched for a whole night but I cannot find anyway to download it.

Now I have sought for help on Baidu academic.

## 3 The abstract for my graduate paper

摘要：随着世界经济的全球化，世界金融领域也逐渐向一体化发展。国际黄金价格（一般以伦敦金市为标准）与各国的经济运行发展、各国之间的贸易往来甚至国际政治事件都具有紧密的联系。并且，黄金相较于其它金属，是最热门的投资产品之一。黄金市场也是一个充满了变化与投机行为的市场，在它的内部，各个经济数据、金融指标之间都存在错综复杂的关系。而随着1973年布雷顿森林体系的瓦解，世界经济原处于的金本位制度逐渐被推翻，黄金价格波动更加频繁与不稳定。由于黄金价格受到供给需求包括投机行为的驱动，其预测难度与日俱增，传统基于线性模型发展起来的金融理论已经不能很好地解释黄金价格的变化规律。20世纪80年代之后，大量的经济学家和数学家们开始了对于非线性模型的探索，以模拟和逼近复杂的黄金价格走势。而自21世纪之后，计算机科学的飞速发展，为需要极其庞大的计算量的非线性方法提供了有力的支持。因此，基于现代计算机科学的国际黄金价格预测系统的开发，具有非常广阔的前景和巨大的现实意义。本文将R/S分析法、机器学习-神经网络方法应用于国际黄金价格数据的研究，对“XAUUSD”价格的时间序列进行分析和预测，最后经私人专家系统修正得出达到一定置信度的预测结果.....

关键词：国际黄金价格、ANN神经网络、Hurst指数、专家系统

## 4 The first Chapter

### 第一章 绪论

#### 1.1 课题研究背景及意义

### 1.1.1 课题研究背景

黄金自古以来被人们视为永恒的金属，象征着至高无上的财富，在历史上被作为货币使用，直到现在也一直在许多国家和地区经济中作为货币的相对当量标准。与大多数期货一样，黄金价格受到供给与需求（包括投机行为的需求）关系的推动。而黄金的需求量巨大，黄金投资品种众多，对于投资者而言，黄金的投资可以抵御通货膨胀和经济动荡，从而达到保值、规避风险的目的。国际黄金价格与国际经济形势具有千丝万缕的联系，世界各国历来对于国际黄金价格的走势相当关注。同时各大公司、金融机构及个人也把买入或做空黄金作为一种投资，希望通过对于国际黄金价格的预测来谋取高额利润。因此，国际黄金价格走势的研究和预测不论是对于国际金融研究领域还是投资机构或个人，都具有及其重要的意义。

## 5 The two papers I read this week

This week, I have read two papers.

### Adaptive Smoothing Neural Networks in Foreign Exchange Rate Forecasting

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### Artificial Neural Network Model for Forecasting Foreign Exchange Rate

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The first paper named "adaptive smoothing NN in FX forecasting". It indicates that Multi-Layer Feed-forward Network (MLFN) is one of the best neural network structures, which could achieve a very high accuracy.

The second paper named "Artificial Neural Network Model for Forecasting Foreign Exchange Rate". This paper mentions Neuron Coefficient Smooth Transition Auto Regression (NCSTAR) algorithm, and it mentions The Hidden Markov Model (HMM). HMM is a pretty good idea for forecasting the forex rate. I'd like to spend some time on it next.

## 6 The study on NCSTAR

Input: A set of observed sequence  $O^1, O^2, O^3, O^4, \dots$

Initialization: select arbitrary model parameters

$$\lambda' = a_{ij}, e_i() ; data = \sum_d P(O^d \setminus \lambda')$$

repeat

$$\{ \lambda = \lambda' , S = S'$$

for each sequence,  $O^d$

{

calculate  $\alpha(t, i)$  for  $O^d$  using forward algorithm

calculate  $\beta(t, i)$  for  $O^d$  using backward

algorithm

calculate the contribution of  $O^d$  to A using

$$A_{ij} = \sum_d \frac{1}{p(O^d)} \sum_t \alpha(t, i) a_{ij} e_i(O_{t+1}^d) \beta(t+1, i)$$

calculate the contribution of  $\sigma^d$  to E using

$$E_i(\sigma) = \sum_d \frac{1}{P(\sigma^d)} \sum_{\{t \setminus O_t^d = \sigma\}} \sigma(t, i) \beta(t, i)$$

}

$$a_{ij} = \frac{A_{ij}}{\sum_i A_{ij}} ; \quad e_i(\sigma) = \frac{E_i(\sigma)}{\sum_r E_i(r)}$$

$$data = \sum_d P(O^d / d_{ij}, e_i())$$

}

until the change in data is less than some predefined threshold