

Horse Racing Prediction Using Artificial Neural Networks

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Abstract: - Artificial Neural Networks (ANNs) have been applied to predict many complex problems. In this paper ANNs are applied to horse racing prediction. We employed Back-Propagation, Back-Propagation with Momentum, Quasi-Newton, Levenberg-Marquardt and Conjugate Gradient Descent learning algorithms for real horse racing data and the performances of five supervised NN algorithms were analyzed. Data collected from AQUEDUCT Race Track in NY, include 100 actual races from 1 January to 29 January 2010. The experimental results demonstrate that NNs are appropriate methods in horse racing prediction context. Results show that BP algorithm performs slightly better than other algorithms but it needs a longer training time and more parameter selection. Furthermore, LM algorithm is the fastest.

Key-Words: - Artificial Neural Networks, Time Series Analysis, Horse Racing Prediction, Learning Algorithms, Back-Propagation

1 Introduction

Artificial Neural Networks (ANN) were inspired from brain modeling studies. Implementations in a number of application fields have been presented ample rewards in terms of efficiency and ability to solve complex problems. Some classes of applications that ANNs have been applied to include classification, pattern matching, pattern completion, optimization, control, data mining and time series modeling [1]. Time series analysis is used for many applications such as predictions [2].

Prediction is making claims about something that will happen, often based on information from past and from current state. One possible way for predicting future events is finding approximations, for example regression of a predicted variable on other events that is then extrapolated to the future. But finding such approximation can be difficult, too [3]. Also, the relationship chosen for regression tends to be linear. The other difficulty with regression is that, the regression equation applies across the entire span of input space [4]. So, we use NN for prediction, a general method of prediction which avoids these difficulties.

ANNs have been employed to predict weather forecasting, traveling time, stock market and etc. Also, ANNs have been applied in predicting game results, such as soccer, basketball, animal racing, etc.

Some works were done in predicting animal racings. Chen *et al* [5] investigated greyhound racing, it was a

very similar environment to horse racing. In their research, they investigated the use of BPNN in predicting races. After that, Jannet Williams and Yan Li in [6] used BPNN to predict horse racing by a network with one hidden layer. Nowadays, horse racing software products, such as Brain Maker, are very popular [7].

In this paper, ANNs have been applied to predict the horse racing in AQUEDUCT Race Track, USA, and acceptable predictions were made. ANN has been used for each horse to predict the finishing time of each horse participating in a race. The best architecture of NN has been investigated by trial and error and different architectures have been compared according to MSE (Mean Squared Error) measure of ten times of running NN for each horse. Therefore, the best architecture is the one which has the minimum MSE measure.

The rest of the paper is organized as follows: The structure of NN and its training algorithms are presented in Section 2. In Section 3 we briefly presented the concept of prediction and some common methods for prediction. Experimental results are presented in Section 4. Finally the paper is concluded in Section 5.

2 Artificial Neural Networks

The brain consists of a large number of highly connected elements called neurons. These neurons have three principal components: the dendrites, the cell body and the axon.

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Artificial Intelligence and Cognitive Science Luca Longo,Ruairi O'Reilly,2023-02-22 This open access book constitutes selected papers presented during the 30th Irish Conference on Artificial Intelligence and Cognitive Science held in Munster Ireland in December 2022 The 41 presented papers were thoroughly reviewed and selected from the 102 submissions They are organized in topical sections on machine learning deep learning and applications responsible and trustworthy artificial intelligence natural language processing and recommender systems knowledge representation reasoning optimisation and intelligent applications

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Data Science and Security Samiksha Shukla,Hiroki Sayama,Kapil Tiwari,Joseph Varghese Kureethara,2025-09-24 This book presents best selected papers presented at the International Conference on Data Science for Computational Security IDSCS 2024 hosted by Christ Deemed to be University India and technically sponsored by The Tejas Scientific Researcher Foundation India from 08 09 November 2024 The book

targets the current research works in the areas of data science data security data analytics artificial intelligence machine learning computer vision algorithms design computer networking data mining big data text mining knowledge representation soft computing and cloud computing [1997 IEEE International Conference on Intelligent Processing Systems](#) ,1997

Neural Networks for Identification, Prediction, and Control D. T. Pham,1995 This publication describes examples of applications of neural networks in modelling prediction and control Topics covered include identification of general linear and nonlinear processes forecasting of river levels stock market prices currency exchange rates and control of a time delayed plant and a two joint robot The neural network types considered are the multilayer perceptron MLP the Elman and Jordan networks the Group Method of Data Handling GMDH the cerebellar model articulation controller CMAC networks and neuromorphic fuzzy logic systems The algorithms presented are the standard backpropagation BP algorithm the Widrow Hoff learning dynamic BP and evolutionary learning Full listings of computer programs written in C for neural network based system identification and prediction to facilitate practical experimentation with neural network techniques are included

Safeguarding the Future Alan Tang,2025-03-31 In the ever evolving landscape of technology emerging innovations like artificial intelligence AI blockchain quantum computing brain computer interfaces BCIs and the Metaverse are transforming industries at an unprecedented rate However with these advancements come significant challenges particularly in the realms of security and privacy Safeguarding the Future Security and Privacy by Design for AI Metaverse Blockchain and Beyond by Dr Alan Tang offers a comprehensive guide to navigating these challenges providing a holistic framework to secure and protect the privacy of these cutting edge technologies What sets this book apart is its unique blend of technical depth and practical application Dr Tang leverages his extensive experience in privacy and security to deliver actionable insights that are crucial for organizations looking to stay ahead in this rapidly changing digital era From aligning business strategies with security and privacy goals to implementing unified frameworks across multiple technologies this book is an essential resource for executives security professionals and anyone involved in the deployment of emerging technologies Key Features In Depth Analysis Detailed exploration of the security and privacy risks associated with AI blockchain quantum computing BCI and other emerging technologies Unified Frameworks A comprehensive step by step guide to creating and operationalizing a unified security and privacy framework adaptable to various technologies Regulatory Alignment Insights into aligning security and privacy practices with global regulations such as GDPR CCPA and ISO standards Case Studies and Real World Examples Practical case studies and examples that illustrate how to apply the concepts discussed in real world scenarios Ethical Considerations Examination of ethical issues surrounding the deployment of these technologies with recommendations for addressing them proactively Future Proofing Strategies Guidance on preparing for future advancements and ensuring long term compliance and security Whether you are a chief technology officer chief privacy officer data protection officer or a security professional this book equips you with the knowledge and tools needed to protect

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Proceedings of the Workshop on Neural Network Applications and Tools, September 13-14, 1993, Liverpool, England Paulo J. G. Lisboa, Malcolm J. Taylor, 1994

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