Fraud Detection

your name

Goldsmiths College
University of London

A thesis submitted for the degree of
B. Computer Science

January 26, 2017

Abstract

Your abstract text goes here.

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Acknowledgements

Personal

This is where you thank your advisor, colleagues, and family and friends.

Institutional

If you want to separate out your thanks for your college or dept.

Abstract

Your abstract text goes here.

Contents

List of Figures

List of Abbreviations

1-D, 2-D . . . One- or two-dimensional, referring in this thesis to spatial dimensions in an image.

Otter . . . . . One of the finest of water mammals.

Hedgehog . . . Quite a nice prickly friend.

1
Introduction

Contents

1.1 Overview of the System

1.2 Motivation

1.3 Contribution

1.4 Thesis Structure

This thesis is structured as follows: In Chapter 2 a detailed background research in the area of *Fraud Detection* is given. In Chapter 3 the system design part is describe. In chapter 4 the implementation part of the system is given. Chapter 5 consists of description of the testing techniques an the testing results. Finally, a conclusion and a direction of future work is given in Chapter 6.

2
Background

2.1 Introduction

This document introduction won't serve as a complete primer on LaTeX. There are plenty of those online, and googling your questions will often get you answers, especially from `http://tex.stackexchange.com`.

Instead, let's talk a little about a few of the features and packages lumped into this template situation. The `savequote` environment at the beginning of chapters can add some wittiness to your thesis. If you don't like the quotes, just remove that block.

For when it comes time to do corrections, there are two useful commands here. First, the `mccorrect` command allows you to highlight a short correction like this one. When the thesis is typeset normally, the correction will just appear as part of the text. However, when you declare `\correctionstrue` in the main `Oxford_Thesis.tex` file, that correction will be highlighted in blue. That might be useful for submitting a post-viva, corrected copy to your examiners so they can quickly verify you've completed the task.

For larger chunks, like this paragraph or indeed entire figures, you can use the `mccorrection` environment. This environment highlights paragraph-sized and larger blocks with the same blue colour.

Read through the `final-report.tex` file to see the various options for one- and two-sided printing, including or excluding the separate abstract page, and turning corrections and draft footer on or off, and the separate option to centre your text on the page (for PDF submission) or offset it (for binding). There is also a separate option for master's degree submissions, which changes identifying information to candidate number and includes a word count. (Unfortunately, LaTeXhas a hard time doing word counts automatically, so you'll have to enter the count manually if you require this.)

2.2 Fraud Detection

Within months of Röntgen's discovery of the X-ray in 1895[**gagliardi_rontgen_1996**], cardiac pathology was being investigated via non-invasive imaging [**gagliardi_cardiac_1996**]. Over the intervening years, cardiac imaging modalities and techniques have advanced significantly. Clinically, cardiac imaging is used for two broad purposes: diagnosis of pathophysiology and guidance of interventional procedures. These applications impose different requirements on imaging equipment, image acquisition time, computational complexity, spatial and temporal resolution, and tissue discrimination. The common diagnostic and interventional cardiac imaging techniques in current clinical practice are reviewed below. An accessible introduction to the physics of medical imaging can be found in Webb's *Introduction to Biomedical Imaging* [**webb_introduction_2002**]. A comprehensive overview of the use of imaging in clinical cardiology is presented in Leeson's *Cardiovascular Imaging* [**leeson_cardiovascular_2011**].

2.2.1 Machine Learning

Beyond the chest X-ray ('plain film'), the key non-invasive imaging modalities in diagnostic cardiology are echocardiography, magnetic resonance imaging, and X-ray computed tomography, which are reviewed below. Nuclear medicine, including

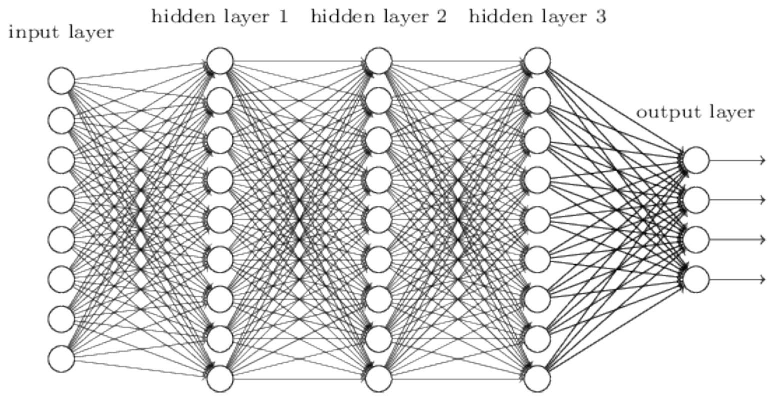

Figure 2.1: A schematic representation of the fully recurrent neural network architecture

positron emission tomography (PET) and single-photon emission computed tomography (SPECT), are not discussed here, as they do not play a role in the chapters to follow.

Recurrent Neural Network

Most all previous RNN based *dst forecasting* research [**pallocchia:2006**] has relied on batch[1] algorithms for training the RNN. Batch training algorithms are unable to incorporate newly arrived information into the model parameters without re-processing the entire data set (which is a costly operation). Furthermore, the training algorithms used thus far for training the RNNs on *dst forecasting* (all of which have been batch first order gradient descent) are known to be susceptible to local minima, and uncertain convergence. This has been a bottleneck in the area (and may stifle future progress in neural based forecasting of geomagnetic phenomena), as well performing models are difficult to obtain, and new events can not readily be incorporated into the model for improved forecasts.

Rand Index Algorithm

The use of acoustic waves for medical diagnosis, inspired by naval sonar, was initially developed in the 1940s [**gagliardi_ultrasonography_1996**]. By 1954, the first clinically useful cardiac ultrasound – examining motion of the mitral valve in stenosis

[1]batch refers to models trained on an in sample data set and then evaluated on an out of sample data set in which no learning occurs in the out of sample data set.

– was reported [**edler_ultrasonic_1957**]. These early scans were one-dimensional images ('A-mode'), sometimes repeated to generate a time axis ('M-mode'). The sector-scanning probe was developed in the 1970s [**bom_ultrasonic_1971**, **griffith_sector_1974**], leading to the 'B-mode' that a modern cardiologist would recognise as an echocardiogram.

3
Design

3.1 Introduction

4
Implementation

4.1 Introduction

5 Testing

5.1 Introduction

6
Conclusion and Future Work

6.1 Introduction

Appendices

A
Review of Machine Learning Algorithms

A.1 Neural Networks

A.2 XXXX

B
Review of Machine Learning Algorithms

B.1 Neural Networks

B.2 XXXX