A Survey on the Investigations into the Generalization of Deep Neural Networks

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List of Contents

Part I

An Introduction to the Research

1   How to use this template (Comment section before use)

?

Imperial College London Business School: Template for : Individual Research Report, MS, Business Analytics,

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COMMENT THE FOLLOWING LINES IN THE TEMPLATE TO HIDE HOW-TO SECTION

```
\section{How to use this template (Comment section before use)}
\input{howtouse.tex}
\pagebreak
```

FONT USAGE

The Arial font is recommended for the Individual Research Report. However, this needs to be installed manually as discussed in this document. For Overleaf, Helvetica has been used. If you are able to install Arial, comment the line `usepackage[scaled]{helvet}` and uncomment `usepackage{uarial}`.

FORMATTING AND PAGE NUMBERING CONVENTIONS USED

- Geometry
    - left-hand margin of 4 cm;

- **–** right-hand margin of 2.5cm (1 inch);

- **–** top margin 2.5cm (1 inch);

- **–** bottom margin 2.5cm (1 inch).

- **–** The Synopsis, Acknowledgements, List of Contents and Notation should be numbered with upper case Roman Numerals.

- **–** The main text, starting with the first page of the first chapter (or Introduction) should be numbered, starting with page 1, using Arabic Numerals, through to the end of the references.

- **– Appendices should be numbered using lower case Roman Numerals. – Check to make sure this is what is needed. If not comment `pagenumbering{roman}` in template before Appendix**

- Pages must be numbered at the bottom centre of the page.

- The title page should be blank.

1.1 Prerequisites

There are 2 primary pre-requisites: First, to install the Bath BibTeX style and second to install the Arial font. Note that if Arial cannot be installed, it may be possible to use Helvetica if the department agrees

1. Install the Bath BibTeX style (See Included Folder)

2. Install Font Arial: See https://www.tug.org/fonts/getnonfreefonts/ and

Notes from Install uarial on a Mac question on Stackexchange:

The font can be easily installed via the script getnonfreefonts. It is available at tug.org: getnonfreefonts. I tried the installation of getnonfreefonts on my Mac.

- Install MacTeX

- Download the installation script. Open the terminal and go to the folder Download

  `cd Download`

- Run the installation: `sudo texlua install-getnonfreefonts`

  The installation finished and the scipts with their execute files getnonefreefonts and getnonfreefonts-sys are now located at `/usr/local/texlive/2011/bin/x86_64-darwin/`

- Now you can run the script `sudo getnonfreefonts-sys -a`

1.2 Images

1.3 Miscellaneous

1.3.1 Hyperlinks

A hyperlink to CNN.com
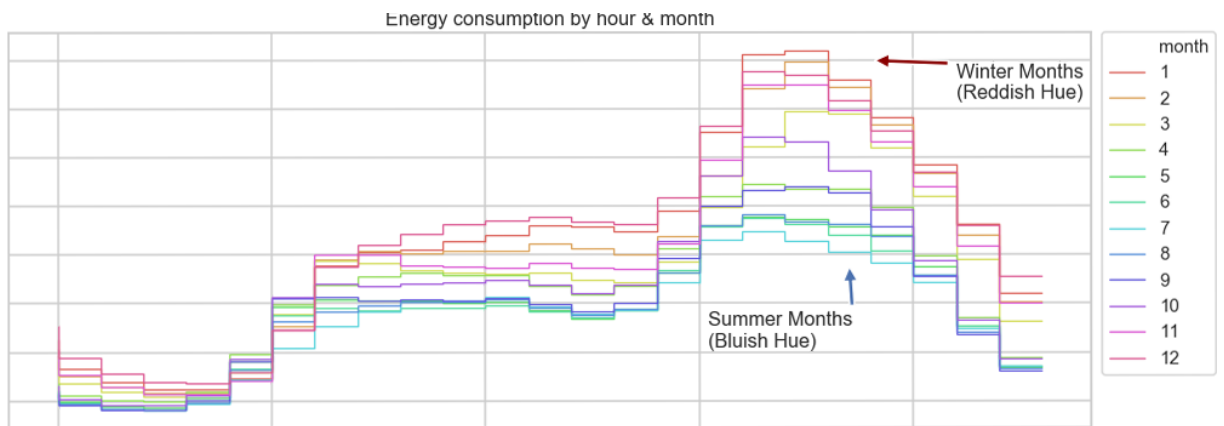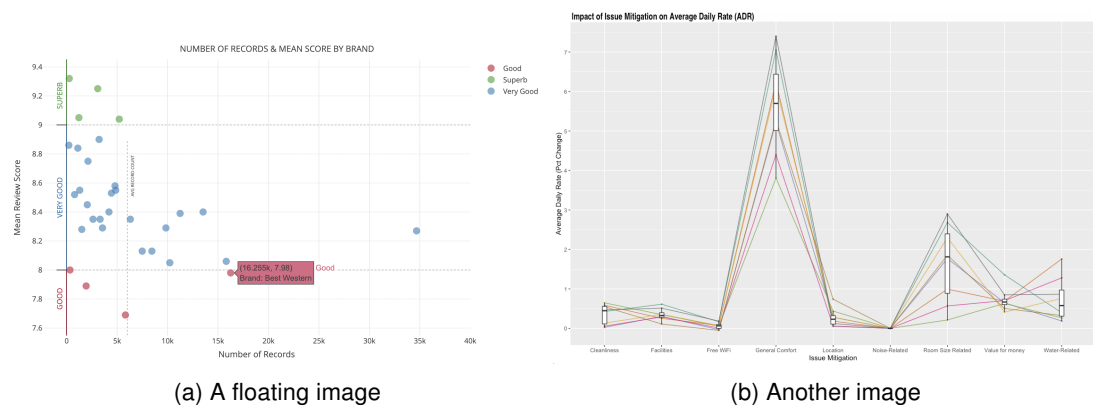
This is a section labelled as "sec1"

Figure 1: This is an image

Odds Ratio (Rx greater than 5% Share of Net Claims)

	2015			2016			2017		
	OR	CI 2.5%	CI 97.5%	OR	CI 2.5%	CI 97.5%	OR	CI 2.5%	CI 97.5%
Payment > $ 715	1.270	0.962	1.677	1.654	1.261	2.176	2.107	1.550	2.879
Overdose > 13.9	2.525	1.971	3.246	1.604	1.262	2.042	1.598	1.217	2.103
Rural > 32%	1.074	0.805	1.435	1.033	0.777	1.376	1.100	0.796	1.522
Income > $ 48000	1.064	0.789	1.437	0.855	0.640	1.144	0.854	0.612	1.191
Food Insecurity > 14.6	2.134	1.616	2.827	2.322	1.771	3.052	2.383	1.753	3.251
Primary Care > 61.5	1.419	1.102	1.830	1.017	0.782	1.321	0.790	0.591	1.055

Table 1: This is a table shown as an image

(a) A floating image

(b) Another image

Figure 2: Floating Images

This is a reference to the section sec1: **??**

Using fbox and minipage
Text enclosed in a box

1.3.2 Python Code Formatting

```python
def wind_chill(temp, wind_speed, a=13.12, b=0.6215, c=-11.37, d=0.16, e=0.3965):
    """
    Converts temperature and wind speed into wind-chill index.
    Formula: wci = a + b*T + c*W^d + e*T*W^d, where T is temperature and W is wind
    speed
    Parameters
        temp: temperature in Celsius
        wind_speed: wind speed in km/h
        a: constant with default value
```

4

```
9         b: constant with default value
10        c: constant with default value
11        d: constant with default value
12        e: constant with default value
13    Example use:
14    >>> wind_chill(-20, 30)
15    -33
16    """
17    if (wind_speed < 5):
18        r = temp
19    else:
20        r = round(a + b*temp + c*(wind_speed**d) + e*temp*(wind_speed**d))
21    return(r)  # This is a placeholder for your code
```

1.3.3 R Code Formatting

```
1 library(shiny)
2 library(shinydashboard)
3 library(data.table)
4
5 # Sample R Code
6 open_connection2 <- function(host,password,user=""){
7   tryCatch({open_connection(host,password,user)},
8          error=function(e){return("ERROR")})
9 }
```

1.3.4 Tables and Equations

Examples with tables, caption centering, equations and aligned equations.

Model	Parameter	Best Fit	Train RMSE	Test RMSE
Linear Regression	-	-	₹16,758,137	₹57,778,006
Random GLM	maxOrder	maxInt.Order = 2	₹15,551,472	₹100,219,602
SVM RBF Kernel	C, Sigma	sigma = 26.76, C = 4	₹17,075,271	₹34,932,347
KNN	k	k = 5	₹12,255,888	₹54,935,698
RandomForest	mtry	mtry = 2	₹8,724,815	₹53,453,612
XGBoost	misc*	max_depth = 3, η = 0.3, γ = 0	₹4,924,454	₹65,211,901

Table 2: This is a table

Split Line in Equations

$$
\begin{aligned}
ln(GVA_{Sector}) = \beta_1 ln(SumOfLights)_t + \beta_2 ln(SumElectricity)_t + \\
\beta_3 ln(SumOfLightsSq)_t + \beta_4 ln(Population)_t + \alpha_i + u_{it}
\end{aligned} \tag{1}
$$

Aligned Equations

$$
y_t = 10.3009 - 0.0042x_L - 0.0045x_B - 0.0032x_c - 0.0046x_{d1} + \ldots + 0.0176x_{d6} + \eta_t
$$

$$
\eta_t = 0.9146\eta_{t-1} + \epsilon_t - 0.5015\epsilon_{t-1}
$$

$$
\epsilon_t =\sim \mathsf{NID}(0, 0.003443)
$$

1.3.5 Citations

This template uses Bath BibTeX: https://ctan.org/pkg/bath-bst?lang=en

See: https://github.com/alex-ball/bathbib/tree/master/bst

This is a citation (**?**) using `citep`.

This is a citation **?** using `cite`

Synopsis

MAXIMUM 250 WORDS All Reports must include a one page synopsis. This should include a clear statement that sets out the terms of reference and objectives of the Report as agreed with the Supervisor.

Acknowledgments

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Notation

The extent to which you list any symbols used in your report must be left to your discretion. Symbols, which are used in several parts of your report, should preferably be listed before the main text for easy reference. Symbols which are used only once or in one part of the report may be referred to in that part only. Generally, try to place yourself in the position of a reader with average background knowledge and arrange the notation in a manner which will be most convenient for him/her to follow.

List of Contents

List of Figures

List of Tables

2 Introduction

Introduction, background to research, overview of research, aims and objectives, terms of reference, key research questions

- The Main Text area is the section that contains your fully formed thesis and it is the section where the 8,000-word limit applies. Your Report, irrespective of the nature of the topic, must contain critical comment based on the considered assessment of the material/evidence presented in it: this is an essential requirement, as are the conclusions of the report.

- Your Report will not be made available to the general public by any means of distribution and, accordingly, you do not need to worry about getting permission from copyright holders in making direct quotations or copying figures from other publications. However, your sources must be acknowledged. You must also indicate by the use of inverted commas or different typeface the quoted material so that it is clearly identified as such. However, if you subsequently write up your work, in conjunction with your Supervisor, as a paper, then you are subject to normal copyright laws and must only quote very brief extracts even from those Journals, which subscribe to the Royal Society's convention on Fair Copying.

- Depending on the nature of the report, the main text should start with a review of previous literature. In a review and discussion of the work of others (and at all times) it should be clear from the text which of the opinions expressed are those of the author and which are those of other people.

- Where appropriate, students can include links to electronic/video material created in support of and as part of the IRR.

Your final Report should be no longer than 8,000 words. The word limit applies to the main text area only, as this is where your report is introduced and then carried forward. Your final word-count should not include: title page, synopsis, acknowledgements, list of contents, notation (if applicable), references, bibliography or appendix/appendices. Shorter Reports are allowed depending on the nature of the research (for example some mathematical and statistical projects are usually shorter than qualitative projects). Reports longer than 8,000 words will be penalised.

If the Report is to contain a considerable number of tables and figures, it may be best to place them in an appendix and use in the main text only such summary tables or charts as will assist the reader in following your arguments without necessarily having to go into great detail. This may help to ensure a smooth and uninterrupted presentation.

5.11 UNACCEPTABLE PRESENTATION **Examiners will not accept projects where the presentational guidelines are not adhered to**. They will not accept projects that have any of the following: Copyright statements (in any format including as a header/footer); Confidentiality statements (in any format including as a header/footer); Non standard font size, type and line spacing; Page numbers missing; No contents pages or contents pages with no page numbers indicated.

3 Literature Review

3.1 Literature Subsection

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4 Data

4.1 Data Subsection

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5 Methodology

5.1 Methodology Subsection

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6 Data Analysis and Discussion

6.1 Analysis Subsection

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7 Conclusion and Recommendations

7.1 Conclusion Subsection

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8   References

9 Appendix

9.1 Appendix Subsection