Design and Development of a Wonderful System Using Extraordinary Methods to Improve Everything

Philip J. Fry

Supervised by Prof Farnsworth

Declaration

I, **Philip J. Fry**, declare that the work in this dissertation titled *"Design and Development of a Wonderful System Using Extraordinary Methods to Improve Everything"* is carried out by me. This work has not been submitted to Anglia Ruskin University or any other educational institution for the award of a degree or educational qualification. I also declare that the information published in this dissertation has been obtained and presented in accordance with academic rules and ethical conduct. Any information obtained from other sources has been properly referenced.

Acknowledgement

This thesis work is dedicated to my husband, Dr. John Zoidberg, who has been a constant source of support and encouragement during the challenges of graduate school and life. I am truly thankful for having you in my life. This work is also dedicated to my parents, William and Karen Ryan, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

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Abstract

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Chapter 1

Introduction

1.1 Overview

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1.2   Problem Background

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Pre Deep Learning object detection techniques, such as Boosted Cascade by Viola & Jones (2001), Histograms of Oriented Gradients (HOG) by Dalal & Triggs (2005) and Deformable Part Models (DPM) by Felzenszwalb et al. (2010) were relatively inaccurate and unreliable for real-world applications (Papageorgiou & Poggio

Figure 1.1: Process of elaborating problem background

2000).

1.3   Research Aim

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1.4   Research Objectives

- To investigate possible adverse impacts of lossy compression algorithms on BLE audio transmission measured by SNR metric.

- To design and develop a working prototype of a lossless compression algorithm capable of working with available BLE bandwidth.

1.5   Research Scope

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1.6   Abridged Methodology

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1.7   Contribution

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Chapter 2

Literature Review

2.1 Overview

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2.2 Handwriting Recognition

Figure 2.1 shows the handwriting recognition taxonomy. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet

Figure 2.1: Handwriting recognition taxonomy

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2.3 Approach A

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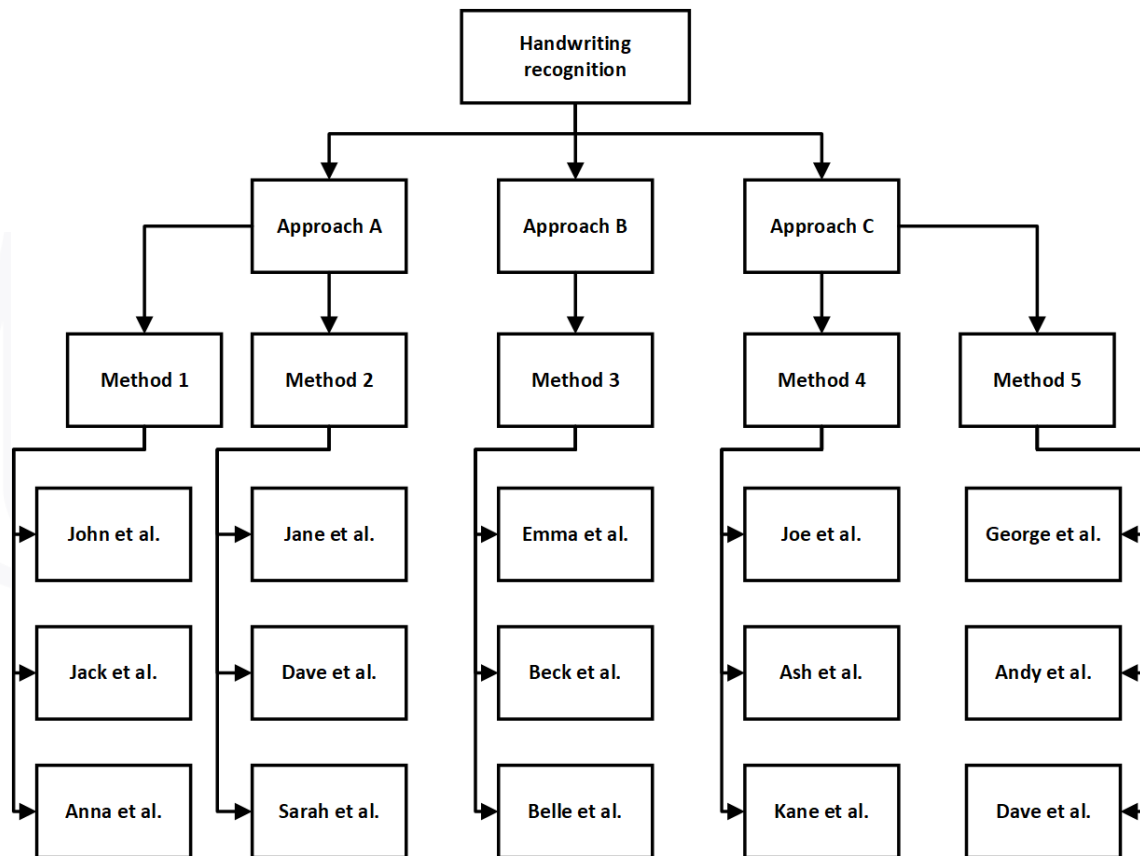
Table 2.1: Impact of SMOTE sampling on model performance

Class	Precision	Recall	F-score
1 (fraud)	0.15	0.63	0.24
0 (legal)	1.00	0.99	1.00
1 (fraud)	0.84	0.58	0.68
0 (legal)	0.99	0.99	1.00

2.3.1 Method 1

Method 1 is about this and that...etc....etc. It uses this and that techniques....
etc..etc......blah..blah...blah. Dalal & Triggs (2005) used this method to detect
this and that....etc..etc......blah..blah...blah. Despite reasonable accuracy fig-
ures, this study has higher computational complexity compared to...etc...etc.

2.3.2 Method 2

Method 2 is about this and that. This method is primarily made to counter those
issues. This method benefits from this feature. Felzenszwalb et al. (2010) used this
method to detect this and that....etc... blah..blah...blah.

2.4 Approach B

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2.4.1 Method 3

Method 3 is about this and that. This method is primarily made to counter those
issues. This method benefits from this feature. Felzenszwalb et al. (2010) used this
method to detect this and that....etc... blah..blah...blah.

2.5   Approach C

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2.5.1   Method 4

Method 4 is about this and that. This method is primarily made to counter those issues. This method benefits from this feature. Felzenszwalb et al. (2010) used this method to detect this and that. . . .etc. . . blah..blah. . . blah.

2.5.2   Method 5

Method 5 is about this and that. This method is primarily made to counter those issues. This method benefits from this feature. Felzenszwalb et al. (2010) used this method to detect this and that. . . .etc. . . blah..blah. . . blah.

2.6   Literature Review Summary

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Table 2.2: Literature review summary

#	Study	Method Description	Pros	Cons
1	John et al.	This study uses method 1 to identify malign cancer cells. . . blah blah blah	High accuracy Speed	Reliance on hyperspectral cameras.
2	Dave et al.	This study uses method 2 to identify malign cancer cells. . . blah blah blah	High accuracy	High computational complexity
3	Anna et al.	This study uses method 1 to identify malign cancer cells. . . blah blah bla	Compatible with this and that	Limited to those

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Chapter 3

Methodology

3.1 Overview

Restate the research problem situation and your corresponding proposed solution concept in a holistic and high-level narrative. Think of this section as an icebreaker for chapter 3.

3.2 Research Framework

Create a technical pipeline (block diagram) that outlines the consecutive steps (processes) that needed to be taken to get the research aim and objectives delivered and the artifact developed. Explain each step (process) in detail. Describe the operations in consecutive chronological order. Provide enough detail that renders your work reproducible. Reproducibility is essential in scientific work. Readers should be able to redo your work just by reading this chapter. Figure 3.1 shows an example of a research framework diagram. The following subheadings are just an example of how the research framework can be elaborated. Change them according to your framework and your research.

3.2.1 Raw Data Acquisition

Populate accordingly. Explain all the necessary details, parameters, experimental setups, and components in detail.

3.2.2 Data Wrangling and Preprocessing

Populate accordingly. Explain all the necessary details, parameters, experimental setups, and components in detail.
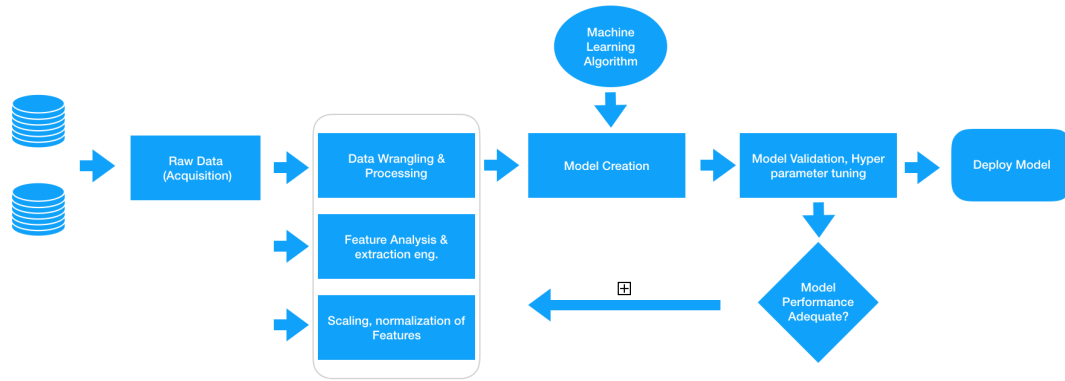
Figure 3.1: Overall research framework

3.2.3 Feature Analysis

Populate accordingly. Explain all the necessary details, parameters, experimental setups, and components in detail.

3.3 Dataset

Explain your data collection method (for studies with primary data collection) or Dataset Structure (for empirical studies that mainly rely on secondary data). Outline the statistical moments, sample types, histograms, missing values, data types, and distribution. training, evaluation, and testing sets.

3.4 Evaluation Metrics

Explain your success/evaluation/measurement criteria. what factors will be measured and how. Metrics like Accuracy, False positive, false negative, true positive, sensitivity, loss, confusion matrix, specificity, F-Score, etc. Note: do not exhibit your results here. Just explain what metrics will be used to measure the proposed model performance. By the way, this is how to create equations in latex. you can create inline equations such as $\sqrt{x^2+1}$ one. Also, you can address your equation parameters like a and x. Equation numbering will be automatic.

$$\sqrt{x^2+1} \tag{3.1}$$

Chapter 4

Results

4.1 Overview

Categories your finding into sub-sections based on their natures and where they contribute and research questions they answer. Use tables and charts (bar charts, pie charts, histograms, scatter plots) generously. Interpret your charts and results. Explain trends, behaviors, and statistical moments. This chapter is all about figures and numbers and charts. Leave high-level explanations for the discussion chapter.

4.2 Heading Based on Research Deliverable

4.3 Heading Based on Research Deliverable

Chapter 5

Discussion

5.1 Overview

Categories your discussion into sub-chapters based on their natures and where they contribute and research questions they answer. Follow the same structure as your results chapter. Move away [Zoom-out] from the numbers and explain what those numbers mean in a more general and holistic scene and how they contribute toward the fulfillment of the research gap. Interpret your findings using high-level explanations. Compare your work with other studies. Outline your method's advantages and drawbacks in comparison to other studies (Sullivan 1997).

5.2 Heading Based on Research Deliverable

5.3 Heading Based on Research Deliverable

Chapter 6

Conclusion

Restate the gap, answer the research question based on your research findings and appraise your work. Criticize your work in the form of future work.

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