

Kyffin Williams: Digital Analysis of Paintings

Final Report for CS39440 Major Project

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Declaration of originality

In signing below, I confirm that:

- This submission is my own work, except where clearly indicated.
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- I have read the sections on unfair practice in the Students' Examinations Handbook and the relevant sections of the current Student Handbook of the Department of Computer Science.
- I understand and agree to abide by the University's regulations governing these issues.

Signature

Date

Consent to share this work

In signing below, I hereby agree to this dissertation being made available to other students and academic staff of the Aberystwyth Computer Science Department.

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Acknowledgements

I am grateful to...

I'd like to thank...

Abstract

Sir John “Kyffin” Williams was a Welsh landscape painter widely regarded as the defining artist of Wales during the 20th century.

???, an Art Historian working with the National Library of Wales has collected a lot of information about Kyffin Williams’ paintings; including, where known, the date the painting was created (or a range of years where the exact year is not know) and the location depicted by the painting.

This information allows for some interesting analysis to be performed on Kyffin Williams’ paintings: temporal analysis to classify the date of paintings for which the actual date is unknown or to narrow down the range of dates; or geographical analysis to be able to classify the location the painting depicts.

Of the two, temporal anaysis is the more viable; geographical analysis would have to assume the scene was painted fairly exactly. Most artists take liberties with the details of the subject making it even more difficult to accurately location the painted location. Temporal analysis can potentially be more concrete as changes in style are likely to be less extreme than the liberties taken with the details of a subject.

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Chapter 1

Background & Objectives

This section should pick-up material from your progress report and enhance it based on the feedback and also your additional experience up to now.

Note: All of the sections and text in this example are for illustration purposes. The main Chapters are a good starting point, but the content and actual sections that you include are likely to be different.

Chapter 2

Development Process

You need to describe briefly the life cycle model that you used. Do not force your project into the waterfall model if it is better described by prototyping or some other evolutionary model. You do not need to write about all of the different process models that you are aware of. Focus on the process model that you have used. It is possible that you needed to adapt an existing process model to suit your project; clearly identify what you used and how you adapted it for your needs.

In most cases, the agreed objectives or requirements will be the result of a compromise between what would ideally have been produced and what was felt to be possible in the time available. A discussion of the process of arriving at the final list is usually appropriate.

You should briefly describe the design method you used and any support tools that you used. You should discuss your choice of implementation tools - programming language, compilers, database management system, program development environment, etc.

2.1 Introduction

Introduce the specific model that you chose to use.

2.2 Modifications

Did you have to modify the model to suit a one-person project. If so, what did you change and why?

Chapter 3

Design

You should concentrate on the more important aspects of the design. It is essential that an overview is presented before going into detail. As well as describing the design adopted it must also explain what other designs were considered and why they were rejected.

The design should describe what you expected to do, and might also explain areas that you had to revise after some investigation.

Typically, for an object-oriented design, the discussion will focus on the choice of objects and classes and the allocation of methods to classes. The use made of reusable components should be described and their source referenced. Particularly important decisions concerning data structures usually affect the architecture of a system and so should be described here.

How much material you include on detailed design and implementation will depend very much on the nature of the project. It should not be padded out. Think about the significant aspects of your system. For example, describe the design of the user interface if it is a critical aspect of your system, or provide detail about methods and data structures that are not trivial. Do not spend time on long lists of trivial items and repetitive descriptions. If in doubt about what is appropriate, speak to your supervisor.

3.1 Overall Architecture

3.2 Some detailed design

3.2.1 Even more detail

3.3 User Interface

3.4 Other relevant sections

Chapter 4

Implementation

The implementation should look at any issues you encountered as you tried to implement your design. During the work, you might have found that elements of your design were unnecessary or overly complex, perhaps third party libraries were available that simplified some of the functions that you intended to implement. If things were easier in some areas, then how did you adapt your project to take account of your findings?

It is more likely that things were more complex than you first thought. In particular, were there any problems or difficulties that you found during implementation that you had to address? Did such problems simply delay you or were they more significant? Your implementation might well be described in the same chapter as Problems (see below).

Chapter 5

Testing

Detailed descriptions of every test case are definitely not what is required here. What is important is to show that you adopted a sensible strategy that was, in principle, capable of testing the system adequately even if you did not have the time to test the system fully.

Have you tested your system on 'real users'? For example, if your system is supposed to solve a problem for a business, then it would be appropriate to present your approach to involve the users in the testing process and to record the results that you obtained. Depending on the level of detail, it is likely that you would put any detailed results in an appendix.

5.1 Overall Approach to Testing

5.2 Automated Testing

5.2.1 Unit Tests

5.2.2 User Interface Testing

5.2.3 Stress Testing

5.2.4 Other types of testing

5.3 Integration Testing

5.4 User Testing

Chapter 6

Evaluation

Examiners expect to find in your dissertation a section addressing such questions as:

- Were the requirements correctly identified?
- Were the design decisions correct?
- Could a more suitable set of tools have been chosen?
- How well did the software meet the needs of those who were expecting to use it?
- How well were any other project aims achieved?
- If you were starting again, what would you do differently?

Such material is regarded as the most important part of the dissertation; it should demonstrate that you are capable not only of carrying out a piece of work but also of thinking critically about how you did it and how you might have done it better. This is seen as an important part of an honours degree. You are expected to realise in which ways it falls short of perfection and of things that you did wrong.

Sadly, the critical evaluation is the weakest aspect of most project dissertations. Because of its importance, some examples are provided on the project website.

Chapter 7

Example L^AT_EX

This chapter includes some example L^AT_EX.

Ever advancing developments in computational power... mean ever more pictures of kittens on the internet. As you will see in Figure 7.1, some of them are very cute.



Figure 7.1: A picture of a kittenDuckworth (2007).

7.1 Overview

In this section I am going to include a spurious label, which appears in the code but has no effect on the display at the time it was inserted. I am also going to include a spurious citation to a journal article Dee & Hogg (2009), a citation to a conference paper Neal *et al.* (2006), a citation to a book Press *et al.* (1992), and a citation to a website Various (2011). All of these citations have been

added to the BibTeX (.bib) file which you'll find in the References directory – they include some tricky stuff (accents and so on) which are explained in the comments in the BibTeX.

7.1.1 A bit of extra text to give the section some bulk

This is a paragraph of extra text just to make this section go over into a second page and to show the use of headers and page numbering that happens automatically once the text flows over to another page.

7.2 A few words of advice on L^AT_EX

One thing you should be aware of using L^AT_EX is that L^AT_EX has its own ideas about where things should be placed and about where page breaks should happen. This minimises the chances of widow and orphan text¹, but it can lead to you feeling like you've lost control if you're used to using software like Word. The best advice for text formatting is to just relax and relinquish control to L^AT_EX; for figures, it's a good idea to use the float package (already included in this template) and put [H] after your includegraphics command. You can see an example of this usage in the code used to insert Figure 7.1 on Page 7.

In the following paragraph, I've put a pointless equation. This is just so that you can see how to include an equation in a document. Equations are numbered separately, just like tables and figures.

$$X = \sum_{i=1}^N x_i + y_i \quad (1)$$

Like tables and figures, if you label an equation you can refer back to it using the ref command (for the number of the equation) or the pageref command (for the page the equation lies on). The source for this document has examples of both types of reference here: Equation 1 lies on Page 8.

7.3 Early work

Year	Kitten frequency	Notes
1993	0.04	World wide web begins to become popular
1995	0.2	Kittens take over
2008	0.34	Cats make a stand

Table 7.1: A pointless table, inserted to show that the list of tables will auto-update

7.3.1 The first signs of this topic

In this section we have a spurious link back to a spurious label, which appeared in Section 7.1.

¹*Orphan* and *Widow* text are when the last line of a paragraph appears on the following page, or where a header appears on one page and the following text appears on the next

Appendices

Appendix A

Useful Equations

$$\mu = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

Figure A.1: Mean

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2} \quad (2)$$

Figure A.2: Standard Deviation

Annotated Bibliography

Dee, H. M., & Hogg, D. C. 2009. Navigational strategies in behaviour modelling. *Artificial intelligence*, **173**(2), 329–342.

This is my annotation. I should add in a description here.

Duckworth, Sylvia. 2007. *A picture of a kitten at Hellifield Peel*. <http://www.geograph.org.uk/photo/640959>. Copyright Sylvia Duckworth and licensed for reuse under a Creative Commons Attribution-Share Alike 2.0 Generic Licence. Accessed August 2011.

This is my annotation. I should add in a description here.

Neal, Mark, Feyereisl, Jan, Rascunà, Rosario, & Wang, Xiaolei. 2006. Don't touch me, I'm fine: Robot autonomy using an artificial innate immune system. *Pages 349–361 of: Proceedings of the 5th international conference on artificial immune systems*. Springer.

This paper...

Press, W.H., *et al.* 1992. *Numerical recipes in C*. Cambridge University Press Cambridge.

This is my annotation. I can add in comments that are in **bold** and *italics and then other content*.

Various. 2011 (Aug.). *Fail blog*. <http://www.failblog.org/>. Accessed August 2011.

This is my annotation. I should add in a description here.