

MapMyNotes

Final Report for CS39440 Major Project

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Declaration of originality

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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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Date

Acknowledgements

I am grateful to...

I'd like to thank...

Abstract

Include an abstract for your project. This should be no more than 300 words.

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Chapter 1

Background & Objectives

1.1 Background

Handwriting notes is still considered to be an important aspect of note taking. In [SMOKER CITE] a study was conducted and out of 61 adults 72.1% preferred to take notes using pen and paper, rather than on a computer. Smoker et al [Cite] concluded that recall rates for handwritten text was greater than that of typed text - proving handwriting notes are viable.

However technology has advanced and we're moving into an era where we track and view everything digitally, from email to calendar entries. Therefore, there is a need to transfer the productivity from handwritten notes to digital notes - so they can be located easily.

Existing note taking tools exist such as OneNote and EverNote

1.1.1 OneNote

1.1.2 EverNote

EverNote is a note-taking and note organisation app, it is both supported on the web and in app form.

- Handwriting recognition would be good

1.2 Analysis

- Chatted with Hannah with what was available in the time frame.
- I looked into different OCR tools to see how I could analyse different characters
- Looked into different ways to binarise an image accordingly.
- Created a list of user stories after the discussion with hannah to decompose the problems.
- I chose to do OCR recognition for singular pages and hopefully getting the top 3 lines as meta-data than normal notes because I needed structure.

- the objective was to produce a web application which would allow a user to upload the image to the website and it would suggest automatic tagging and integrate with a google calendar.
- I wanted to do the whole thing as OCR but a compromise would be that I include OCR and image segmentation into the dissertation as initially it was just going to be a web application.

1.3 Process

The project has been completed using an Agile approach. More specifically, a scrum [TODO CITE] approach has been used along with Extreme Programming [cite]. In the scrum methodology sprints are used to identify tasks and user stories to complete. At the end of every sprint a review and retrospective was conducted to analyse the performance of a sprint; this highlighted any issues with the process for the given sprint as well as thinking about improving this to be more effective next sprint.

- Story points per sprint analysis.
- Taiga.io
- Planning and retrospectives with weekly blog posts

As well as Scrum, many Extreme Programming principles was used.

- Continuous Integration
- TDD
- Refactoring
- YAGNI
- CRC cards

Chapter 2

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.

You should also identify any support tools that you used. You should discuss your choice of implementation tools - programming language, compilers, database management system, program development environment, etc.

Some example sub-sections may be as follows, but the specific sections are for you to define.

2.1 Overall Architecture

2.2 Some detailed design

2.2.1 Even more detail

2.3 User Interface

2.4 Other relevant sections

Chapter 3

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?

You can conclude this section by reviewing the end of the implementation stage against the planned requirements.

Chapter 4

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.

The following sections indicate some areas you might include. Other sections may be more appropriate to your project.

4.1 Overall Approach to Testing

4.2 Automated Testing

4.2.1 Unit Tests

4.2.2 User Interface Testing

4.2.3 Stress Testing

4.2.4 Other types of testing

4.3 Integration Testing

4.4 User Testing

Chapter 5

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 an 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.

There will be good things and room for improvement with any project. As you write this section, identify and discuss the parts of the work that went well and also consider ways in which the work could be improved.

Review the discussion on the Evaluation section from the lectures. A recording is available on Blackboard.

Appendices

Appendix A

Third-Party Code and Libraries

If you have made use of any third party code or software libraries, i.e. any code that you have not designed and written yourself, then you must include this appendix.

As has been said in lectures, it is acceptable and likely that you will make use of third-party code and software libraries. The key requirement is that we understand what is your original work and what work is based on that of other people.

Therefore, you need to clearly state what you have used and where the original material can be found. Also, if you have made any changes to the original versions, you must explain what you have changed.

As an example, you might include a definition such as:

Apache POI library The project has been used to read and write Microsoft Excel files (XLS) as part of the interaction with the clients existing system for processing data. Version 3.10-FINAL was used. The library is open source and it is available from the Apache Software Foundation [2]. The library is released using the Apache License [1]. This library was used without modification.

Appendix B

Ethics Submission

This appendix includes a copy of the ethics submission for the project. After you have completed your Ethics submission, you will receive a PDF with a summary of the comments. That document should be embedded in this report, either as images, an embedded PDF or as copied text. The content should also include the Ethics Application Number that you receive.

Appendix C

Code Examples

3.1 Random Number Generator

The Bayes Durham Shuffle ensures that the psuedo random numbers used in the simulation are further shuffled, ensuring minimal correlation between subsequent random outputs [6].

```
#define IM1 2147483563
#define IM2 2147483399
#define AM (1.0/IM1)
#define IMM1 (IM1-1)
#define IA1 40014
#define IA2 40692
#define IQ1 53668
#define IQ2 52774
#define IR1 12211
#define IR2 3791
#define NTAB 32
#define NDIV (1+IMM1/NTAB)
#define EPS 1.2e-7
#define RNMIX (1.0 - EPS)

double ran2(long *idum)
{
    /*-----*/
    /* Minimum Standard Random Number Generator      */
    /* Taken from Numerical recipies in C              */
    /* Based on Park and Miller with Bays Durham Shuffle */
    /* Coupled Schrage methods for extra periodicity    */
    /* Always call with negative number to initialise  */
    /*-----*/

    int j;
    long k;
    static long idum2=123456789;
```

```
static long iy=0;
static long iv[NTAB];
double temp;

if (*idum <=0)
{
    if (-(*idum) < 1)
    {
        *idum = 1;
    }else
    {
        *idum = -(*idum);
    }
    idum2=(*idum);
    for (j=NTAB+7; j>=0; j--)
    {
        k = (*idum)/IQ1;
        *idum = IA1 *(*idum-k*IQ1) - IR1*k;
        if (*idum < 0)
        {
            *idum += IM1;
        }
        if (j < NTAB)
        {
            iv[j] = *idum;
        }
    }
    iy = iv[0];
}
k = (*idum)/IQ1;
*idum = IA1*(*idum-k*IQ1) - IR1*k;
if (*idum < 0)
{
    *idum += IM1;
}
k = (idum2)/IQ2;
idum2 = IA2*(idum2-k*IQ2) - IR2*k;
if (idum2 < 0)
{
    idum2 += IM2;
}
j = iy/NDIV;
iy=iv[j] - idum2;
iv[j] = *idum;
if (iy < 1)
{
    iy += IMM1;
}
```

```
if ((temp=AM*iy) > RNMx)
{
    return RNMx;
}else
{
    return temp;
}
}
```

Annotated Bibliography

- [1] Apache Software Foundation, “Apache License, Version 2.0,” <http://www.apache.org/licenses/LICENSE-2.0>, 2004.

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

- [2] ———, “Apache POI - the Java API for Microsoft Documents,” <http://poi.apache.org>, 2014.

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

- [3] H. M. Dee and D. C. Hogg, “Navigational strategies in behaviour modelling,” *Artificial Intelligence*, vol. 173(2), pp. 329–342, 2009.

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

- [4] S. Duckworth, “A picture of a kitten at Hellifield Peel,” <http://www.geograph.org.uk/photo/640959>, 2007, 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.

- [5] M. Neal, J. Feyereisl, R. Rascunà, and X. Wang, “Don’t touch me, I’m fine: Robot autonomy using an artificial innate immune system,” in *Proceedings of the 5th International Conference on Artificial Immune Systems*. Springer, 2006, pp. 349–361.

This paper...

- [6] W. Press *et al.*, *Numerical recipes in C*. Cambridge University Press Cambridge, 1992, pp. 349–361.

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

- [7] Various, “Fail blog,” <http://www.failblog.org/>, Aug. 2011, accessed August 2011.

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