<Place Title Here>

91.423/523 Computer Vision Final Project, UMass Lowell

<Author1, Author2, Author3>  
  
<author1@email, author2@email, author3@email>

**Abstract**

The ABSTRACT is to be in fully-justified italicized text, at the top of the left-hand column, below the author and email information. Use the word “Abstract” as the title, in 12-point Times, boldface type, centered relative to the column, initially capitalized. The abstract is to be in 10-point, single-spaced type. The abstract may be up to 3 inches (7.62 cm) long. Leave two blank lines after the Abstract, then begin the main text.

# Introduction

This document contains guidelines on the content (section 2) and formatting (section 3) of the final project report. Please refer to the course website for detailed submission instructions and deadlines. You should submit a PDF report and code.

# Contents of the Report

## Writing Style

The style of the report should be that of a scientific research paper. Even though this is a course project and therefore the instructor is the primary audience, assume that others will read it, e.g. fellow classmates, prospective employers, graduate school admission committee. Therefore, do not assume the reader knows what you are doing. Do not include personal comments, e.g. “I wanted to do this project because I have always been interested in panoramas,” instead describe the work using third person or the royal “we.”

SPELL CHECK your report and correct all grammar mistakes. If you need help with writing, please see the Writing Center tutors at the University. Incomprehensible reports will be given a FAIL grade.

Figure : Example of a figure with caption. Captions are set in roman, 9 point. Use a Drawing area to make space for figures.

## Sections

Each section should have a title in the “Heading 1” format, e.g. “1. Introduction”, etc. You can use subsections (1.2) but not sub-subsections (1.1.1). To qualify for the highest grade, your report should include ALL of the following sections (the page guidelines below are given for an 8-page report, see next section for page limits for different team sizes and scale it accordingly):

Title and author(s)

* use placeholders above, include emails
* the title should be descriptive, e.g. “Fast Pedestrian Detection Using GPUs”, not “Project Report”

Abstract ~ 1 paragraph

* briefly summarize your paper

Introduction ~1 page

* in the first paragraph, explain, what problem does your method solve? e.g. classify tumors as malignant or benign.
* include a figure to illustrate
* why should we care about the **problem**?
* briefly, introduce the method you are using
* why should we care about the **method**?

Background ~ ½ page

* what methods have others already tried to solve this problem? Cite related work and explain each method in 2-3 sentences (see section 2 for citation format)
* **GRADS**: cite at least 3 research papers

Approach ~2 pages

* what is your method?
* explain the algorithm, but not the code implementation details, e.g. function names, operating systems, etc.
* do not describe results yet, leave for Evaluation
* use math formulas and/or algorithm pseudocode whenever possible; explain all variables and formulas
* even if you re-implemented an existing method, do not assume the reader knows what it is, describe it here (assuming familiarity with class material is fine)
* state exactly what you implemented and whether you used existing software libraries; include code summary table (see below)

Dataset ~½ page

* what data was used? Include examples
* if using a machine learning method (classification, etc.), how were the annotations obtained? What were the training and test data split(s)?

Evaluation ~3 pages

* this is the most important section, as reflected in the relative page count
* show anecdotal results (include screenshots), show both good results and failures
* analyse performance: what parameters/design choices affect it? What could be improved?
* explain feature extraction, experiment setup and results
* **GRADS**: include at least one table/plot of quantitative results, e.g. mean average precision on the test set, mean reprojection error, ROC, etc. and compare to at least one different method (could be a modified version of yours).

Conclusion ~ paragraph

* summarize the paper, similar to abstract
* what is the take-away message?

Team roles ~ 1-2 paragraphs

* say exactly what each team member has done, data collection, writing, implementation (how many lines of code written), in detail.

References ~ page

* this is always the last section, no section number
* citations should be in the format given below.

## Page count

Your report should have the following number of pages:

* 3+ members: 8 pages
* 2 members: 6 pages (section page guidelines proportional)
* 1 member: 4 pages (section page guidelines proportional)

## Figures/Images/Screenshots

Always include a descriptive caption, i.e. “Figure 1. Mean reprojective error as a function of iteration number” not “Figure 1. Results.” Images and figures should take a little space as possible while still being clearly legible and visible. Be aware of large image sizes, downsize images whenever possible.

## Submitting Code

Submit your code, including a README. Please be aware of file size limits. In the method section, include a **code summary table** with code filenames and brief description of what each one does and the author(s). Do NOT submit third-party libraries, but include a link to download them in a README.

Open-source projects hosted on GitHUB are encouraged!

Table Summary of Submitted Code

|  |  |  |
| --- | --- | --- |
| **filename** | **description** | **author** |
| main.cpp | main program | Jane Doe |
| Stitcher.cpp | Stiches 2 images | Mary Smith |

# Formatting

The formatting (fonts, margins, two-column format, title, etc.) should be the same as this document. If you use Word, you can simply rename the document and replace the contents with your report.

All text must be in a two-column format. The total allowable width of the text area is inches (17.5 cm) wide byinches (22.54 cm) high. Columns are to be 31/4 inches (8.25 cm) wide, with a 5/16 inch (0.8 cm) space between them. The main title (on the first page) should begin 1.0 inch (2.54 cm) from the top edge of the page. The second and following pages should begin 1.0 inch (2.54 cm) from the top edge. On all pages, the bottom margin should be inches (2.86 cm) from the bottom edge of the page for 8.5 × 11-inch paper; for A4 paper, approximatelyinches (4.13 cm) from the bottom edge of the page.

## Margins and page numbering

Figure 2: Short captions should be centered.

All printed material, including text, illustrations, and charts, must be kept within a print area  inches (17.5 cm) wide by inches (22.54 cm) high.

## Type-style and fonts

Wherever Times is specified, Times Roman may also be used. If neither is available on your word processor, please use the font closest in appearance to Times to which you have access.

MAIN TITLE. Center the title 1-3/8 inches (3.49 cm) from the top edge of the first page. The title should be in Times 14-point, boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave two blank lines after the title.

AUTHOR NAME(s) and EMAIL(s) are to be centered beneath the title and printed in Times 12-point, non-boldface type. This information is to be followed by two blank lines.

The ABSTRACT and MAIN TEXT are to be in a twocolumn format.

MAIN TEXT. Type main text in 10-point Times, singlespaced. Do NOT use double-spacing. All paragraphs should be indented 1 pica (approx. 1/6 inch or 0.422 cm). Make sure your text is fully justified—that is, flush left and flush right. Please do not place any additional blank lines between paragraphs.

Figure and table captions should be 9-point Roman type as in Figures 1 and 2. Short captions should be centred. Callouts should be 9-point Helvetica, non-boldface type. Initially capitalize only the first word of section titles and first-, second-, and third-order headings.

FIRST-ORDER HEADINGS. (For example, 1. Introduction) should be Times 12-point boldface, initially capitalized, flush left, with one blank line before, and one blank line after.

SECOND-ORDER HEADINGS. Should be Times 11-point boldface, initially capitalized, flush left, with one blank line before, and one after. Do not use third-level headings. Please do not use third-level headings, e.g., *1.2.1. Subsection*, use the following format instead:

**Subsection**: place subsection text in the following paragraphs. Do not use numbers in the subsection heading but do make it bold font.

## Footnotes

Please use footnotes[[1]](#footnote-1) sparingly. Indeed, try to avoid footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence). If you wish to use a footnote, place it at the bottom of the column on the page on which it is referenced. Use Times 8-point type, single-spaced.

## Mathematics

In Word, use the *Insert->Equation* tool, for example:

If you are reproducing equations published in a book or article, be sure to cite the source, unless it was material covered in the course. Whenever possible, use published as well as your own equations to formally explain your method. For example, the following:

*Our method combines the results of individual classifiers using*

*Where is a weight set using cross-validation…*

is better than

*Our method combines the results of individual classifiers using weights and picking the minimum score...*

## Citations

Include proper citations to other research papers you describe. List and number all bibliographical references in 9-point Times, single-spaced, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [4]. Where appropriate, include the name(s) of editors of referenced books. In Word, use the *References* tool.

When citing a multi-author paper, you may save space by using “*et alia*”, shortened to “*et al*.” (not “*et. al.*” as “*et*” is a complete word.) However, use it only when there are three or more authors. Thus, the following is correct:

“Frobnication has been trendy lately. It was introduced

by Alpher [3], and subsequently developed by Alpher and Fotheringham-Smythe [1], and Alpher *et al.* [2].”

This is incorrect: “... subsequently developed by Alpher et al. [1] ...” because reference [1] has just two authors. For this citation style, keep multiple citations in numerical (not chronological) order, so prefer [1, 3, 4] to [3, 1, 4].

## Figures

All tables, images, plots and other graphics should be placed inside a figure with a caption, and referenced in the main text, e.g., *Figure 1 shows the main results table.*

All graphics should be centered. Please ensure that any point you wish to make is resolvable in a printed copy of the paper. Resize fonts in figures to match the font in the body text, and choose line widths which render effectively in print. Many readers, even of an electronic copy, will choose to print your paper in order to read it. You cannot insist that they do otherwise, and therefore must **not** assume that they can zoom in to see tiny details on a graphic.

A note on LATEX: When placing figures in LATEX, it’s almost always best to use \includegraphics, and to specify the figure width as a multiple of the line width as in the example below

\usepackage[dvips]{graphicx} ...

\includegraphics[width=0.8\linewidth]

{myfile.eps}

## Color

Color is valuable, and will be visible to readers of the electronic copy. However ensure that, when printed on a monochrome printer, no important information is lost by the conversion to grayscale.

# References

1. A. Alpher, and J. P. N. Fotheringham-Smythe. Frobnication revisited. Journal of Foo, 13(1):234–778, 2003.
2. A. Alpher, J. P. N. Fotheringham-Smythe, and G. Gamow. Can a machine frobnicate? Journal of Foo, 14(1):234–778, 2004.
3. A. Alpher. Frobnication. Journal of Foo, 12(1):234–778, 2002.
4. Authors. The frobnicatable foo filter, 2014. Face and Gesture 2014 submission ID 324. Supplied as additional material efg324.pdf.
5. Authors. Frobnication tutorial, 2014. Supplied as additional material tr.pdf.

1. This is what a footnote looks like. It often distracts the reader from the main flow of the argument. [↑](#footnote-ref-1)