

# **CS5342: Multimedia Computing and Applications** **Spring 2016**

## **Continuous Assessment**

### **HOMEWORK IS PART INDIVIDUAL AND PART GROUP**

REMEMBER TO CHECK FOR ANNOUNCEMENTS ON THE CLASS WEB SITE:

<http://www.comp.nus.edu.sg/~cs5342/>

### **Survey Paper (20%, Individual)**

**Description:** The purpose of the survey paper is to encourage you to explore the state of the art work currently being done in your selected area of interest. According to ACM Computing Surveys, a survey paper is defined as “A paper that summarizes and organizes recent research results in a novel way that integrates and add understanding to work in the field. A survey article assumes a general knowledge of the area; it emphasizes the classification of the existing literature, developing a perspective on the area, and evaluating trends.” You are required to pick *any* one topic in the area of multimedia computing and write a survey paper. The survey should cover research published in the years 2014 and 2015. A good way to start is to look at recent papers that appear in the *ACM Multimedia* conference or *ACM TOMM* journal or the *IEEE Transactions on Multimedia* (TMM) journal or the *Springer Multimedia Systems* (MMSJ) journal. You are expected to cover around 10 papers in that topic area which represents the state of the art.

The survey paper should have the following structure:

- Title
- Author name
- Abstract
- Introduction
- Survey
- Your analysis of the work done so far, gaps and opportunities
- Conclusion
- References

In the survey part, you need to give critical analysis of each paper presented in the survey. This includes your critical assessment of the research problem, solution, performance evaluation and conclusion presented in the paper. A classification of the research approaches adopted can make your writing a lot easier and more understandable.

You should adopt the [ACM Computing Surveys](#) conventions. Read the editorial charter. You are highly encouraged to look at any paper in any issue of that journal for a sample. This journal is available electronically through the NUS Digital Library. Once again, the actual paper format to be used would be the ACM Style found [here](#).

You will be graded based on the following criteria:

	Components	Grade Percentage
1	Research background, general context of this area.	3%
2	Literature review, critical evaluation of these views (each work's targeted problem, main contribution, novelty, advantages and disadvantages), general conclusion of the state-of-the-art.	10%
3	References are consistent and well formatted.	2%
4	Language, organization (well-written introduction, clear logical sequence).	2%
5	Quality of the previous work summarization (e.g., a table of comparison of previous works in different aspects: problem, subtopic, technique used, dataset, evaluation methods, etc.), and potential research problems, issues or gaps that are worth of further exploration.	3%
	Total	20%

**Deliverables (by each student):**

The survey paper which should contain your information: name, matriculation number, contact information. Please submit a softcopy in PDF format via the IVLE Workbin.

**Deadline:**

The survey paper is due 11:59 pm on Wednesday 10<sup>th</sup> February 2016.

## Assignment (20%, Individual)

**Description:** The purpose of the assignment is to intensively familiarize you with a state of the art technique currently being used in your own chosen area of interest, which ideally should be one component of your group project. The motivation for this assignment is to develop expertise with a state of the art technique in multimedia computing by doing a full-scale implementation of that technique. You are required to pick *any* one technique in the area of multimedia computing and do its full implementation. Any language and platform will be accepted. It is recommended that you pick the technique that is relevant to your course final group project (which has at this point already been approved). Ideally, you should implement one of the standard techniques in your project area, as identified from your already submitted survey assignment. You should fully implement your technique (existing available implementations in public domain or otherwise cannot be used for this project). Then you should test the implemented technique on a sufficient amount of test data and report the results along with a critical discussion on the quality of the results. If you wish, you could also implement one of the techniques which have been taught in class. Some possibilities include:

- JPEG (any one version - not all variants)
- MPEG-2 (any one version - not all variants)
- Bag of Visual Words Technique for Image retrieval
- Cross Media Relevance Model for Image Annotation
- Twin Comparison Method for Gradual Shot Boundary Detection

You will be graded based on the following criteria:

Implementation		Experiment Report	
Source & program	10%	Performance evaluation /Result analysis	4%
Testing data	2%	Findings & discussion	4%
Total		20%	

**Deliverables (by each student):**

- Your information: name, matriculation number and contact information.
- The brief report (a softcopy) that includes a short description of technique (with references), experiments and discussion.
- The softcopy of code, executable file and test data. Also, instructions (i.e., a **readme** file) on how to compile and run your code should be included.
- Note: Zip your files and report into an archive and upload the zip file to IVLE Workbin.

**Deadline:**

The assignment is due 11:59pm on 7<sup>th</sup> March 2016.

**Project (60%, Group of 3)**

**Description:** In this group project, you are supposed to form a group of 3 members and choose your own project topic that is related to multimedia computing, analysis or applications. You can choose a topic that is related to one of the topics covered in this module such as content based retrieval, content processing, surveillance applications, multimedia data mining, summarization, etc. The topic could relate to work that will finally appear in your thesis but under the overall multimedia context. Ideally it is an extension of this module’s assignments, in which you and your group members are to implement basic multimedia related algorithms or techniques. The extension could be an improvement of previous algorithms as baseline, or applying state-of-the-art techniques to novel situations with analytical as well as empirical performance evaluation and comparison. There are three parts to submit: 1) proposal, 2) interim project report, and 3) final project (source and report). You are required to give a demo presentation about the project at the end of the module and your project will be graded as follows:

	Components	Grade Percentage
1	Proposal	5%
2	Interim project report	5%
3	Demo and presentation	35%
4	Source code	5%
5	Final project report	10%
	Total	60%

## Step 1: Proposal (5%, Group)

### Aim:

The idea of this proposal is to decide on your course project early on so that work can be carried out throughout the semester. Note that the project contributes towards a significant proportion of the grade and hence careful planning is necessary. One of the purposes of the proposal is to ascertain that the project you have chosen is of the right size and complexity (it should neither be too big nor too small). The proposal will either be accepted or you will be asked to modify it till it is finalized. I expect the projects to be finalized by February 12 latest. If you do not have a finalized project by February 12, that can seriously jeopardize the project schedule. Please note that doing the project is compulsory. Non-submission of the project will lead to the award of a F grade irrespective of the performance in other components of the course.

### Description:

As outlined in Lecture 1, you may search for recent multimedia systems papers to pick one (or few) papers which will be understood, analyzed, implemented (and hopefully improved). You own novel improvement/extension will be necessary for obtaining the highest grade. The end result of this project is a proper, working prototype of the idea in the paper(s). Alternatively, you can propose any other type of project which has an implementation component. It is expected that the output is of at least a masters level technical project. A partial list of some of the projects done in the past versions of this course is available [here](#). This project is supposed to be an individual project. Also, if you are doing this project as a part of another course or your company work or your thesis work, please get written/email consent from the appropriate party.

### Deliverables:

Prepare a one- or two-page proposal from each group that contains the following information. Note that group members will receive the same marks.

- Your group information: names, matriculation numbers, contact information.
- A title of the project.
- The relevant details if it is to be done as a part of the thesis, company work or another project in some other course.
- A description of the specifics of the project.
- A brief description of the motivation for picking this project.
- State the methodology – how will you go about doing this project.
- A brief description of the resources. For example, it should include the platform for the implementation. It is also good to start thinking about test data now itself.
- A time schedule for the project (note the March 11 deadline for the intermediate report).
- References.

### Deadline:

The completed proposal is due 5:00 pm on Friday, 5<sup>th</sup> February 2016. You are required to submit the softcopy of the proposal via IVLE Workbin.

## Step 2: Interim Project Report (5%, Group)

### Aim:

The purpose of this interim report is to gauge the progress of the projects. I would like to get an idea of what has been done in each project so far. If there is any cause for concern, I will provide feedback so that corrective action can be taken mid-course. While this report will not be graded, submission is mandatory.

### Report Content:

The main content of the interim project report should first precisely state the scope of your work. You should then provide a brief description (based on your own understanding) of the technique or the algorithm that you intend to implement. The design of the code either in terms of functional blocks or in form of data structures, etc., should be provided. The implementation platform (PC/workstation type, language, libraries, borrowing of any related public-domain code, etc.) should be precisely detailed. Also describe how you will obtain the test data to check the correctness and performance of the implementation. Any preliminary thoughts on either the novel extension or improvement can possibly be described.

### Deliverables:

Prepare an interim report of (up to a maximum of) five pages length from each group that contains the following information. Note that group members will receive the same marks.

- Your group information: names, matriculation numbers, contact information.
- The title of the project.
- Since you will be having a better idea now, state precisely the scope of the work that you plan to complete.
- A description of the snapshot of what has been done till now as detailed above in the report content section.
- An updated time schedule for the project (note the April 13 deadline for the final project report).
- References.
- Encountered or foreseen problems, if any.

### Deadline:

The completed proposal is due 11:59pm on 11<sup>th</sup> March 2016. You are required to submit a softcopy of the interim report uploaded into the IVLE Workbin.

## Step 3: Final Project Submission (50%, Group)

### Guidelines:

Each group project should result in a detailed written technical report. The report should be self-contained and readable. Also, it should be written with the readers in mind. Any CS5342 class member should be able to understand your report and benefit from the results that you have obtained. Therefore, you should include adequate references and/or background material. You should make use of appropriate diagrams, graphs, figures and code fragments

to enhance the readers' comprehension of your project. The following format is suggested but you do not have to follow it exactly:

1. Abstract: It comes first in your report but you should write it last.
2. Introduction: include background material and discuss the scope as well as the limitations of your project.
3. Main body: this is really the core of your project -- it should fully discuss the work you have done.
4. Results
5. Conclusions
6. References
7. Recommendations: especially for future work and unsolved problems
8. Appendices: optionally for any supporting material.

**Note:** *plagiarism* is stealing or passing off somebody else's ideas or words as one's own – using material without crediting the source. This is **not** allowed.

### Report Format:

You are encouraged to study the guidelines for [experimental papers](#) in the Machine Learning journal. Note that some of the machine learning specific points may not apply to your project. The actual paper format to be used would be the ACM Style found [here](#).

You will be graded based on your demo and presentation (35%), code (5%), project report (10%) which includes a critical discussion about the findings:

- Performance of the technique in terms of accuracy
- Performance of the technique in terms of speed
- Failure cases and limitations
- Suggested scope for improvement

### Deliverables (by group):

Prepare the final project submission package that contains the information below. The grade will be considered by the group as a whole, but groups should list each member's contribution to their project (e.g., discussion survey, data collection, implementation, report etc.).

- Your group information: names, matriculation numbers and contact information.
- The project report as described above (a softcopy).
- The softcopy of a 15-minute (10-15 slides) slide presentation (PowerPoint or any other package). This should basically be used for your presentation.
- The softcopy of code, executable file and test data. Please also include a **readme** file with instructions on how to compile and run your code. Put everything (source code, runnable file, and test data, readme.txt) into one folder named “project”. Put the “project” folder and your report together under and a folder named “MatricNo\_Name” and compress it to a zip file. (Substitute the “MatricNo” and “Name” with your own information.
- Submit the ZIP file via IVLE Workbin. Please do not email any material.

- You *will be required* to sign-up for a 20 minute presentation and demo session with the instructor and the TA(s). Your team has to make a presentation using your slides. Please involve all the team members. The demo of what you built should be a part of the presentation.

**Deadline:**

The complete project package is due on 11<sup>th</sup> April 2016. *Please note that you can submit it before the deadline too.* However, late submission will result in a penalty in terms of some marks being deducted.

**Late submission policy.**

- late within 24 hours: 20% reduction in marks;
- late within 3 days: 50% reduction in marks;
- late within a week: 70% reduction in marks;
- after one week: zero marks.

## Additional Notes

No plagiarism is tolerated. While you can talk to other students and you are encouraged to use the IVLE Forum, you cannot copy source code and/or text in your report. If you are not sure whether something is permissible, either talk to the instructor or consult the university policy at <http://www.usp.nus.edu.sg/curriculum/acad-matters/academic-code.html>.