CS143: Introduction to Computer Vision
Final Project

Project Proposals Due: November 13 at 10:59am.
Projects Due: December 14 at 10:59am.

The assignment is worth 30% of your total grade; this is equivalent to 2 homework assignments.

Goals.

You have learned a lot of techniques that are used in computer vision today. With this set of tools you can actually solve some interesting and challenging problems. The project is your chance to apply some of these tools to a problem that is of interest to you.

There are a number of components to a good project

- Choosing the project. It's hard to choose something that is both interesting and doable in four weeks. We are here to help in this process.
- Formalizing the problem. This involves taking an idea like "finding mouths in single images" and formalizing it (e.g. using Bayesian probability) and then turning this into something that can be computed.
- Data collection. You will need data with which to test your algorithm. The safest bet is to use data that others have already gathered and made available. Ask us if you need help. Don't plan on collecting new data.
- Algorithm development. Please develop your software in Matlab. Set incremental goals. Test your software in stages. Use good programming practices (don't let Matlab make you lazy). Try to break your code! If it works the first time don't believe it; try strange cases.
- Experimentation. You want to show us experiments that illustrate the ideas and the behavior of your method. Don't overwhelm us with results but rather choose good illustrative examples (of success and failure).
- Write-up. A key part of any research project is effective communication of the results (more below). Unlike the homeworks, *your grade will be determined by your writeup.*

Tips.

Don't get carried away. Choose something that seems small and then set intermediate goals. You want to have a fall-back strategy if you don't meet your ultimate goals.

These projects should not be basic research. If nobody has ever done this before then the risks are too high for a final project. Choose something from the literature that seems doable and implement that.

The Internet.

The Web is a great source of ideas, papers, data, and even code. If you do get data, code, or ideas from the web you MUST disclose this. Become a fanatic about appropriately citing work from any source.

Project Ideas.

See the November 6 lecture slides for some project ideas.

Project Proposals.

Project proposals are a ONE page document with the following sections:

- **Title:** A short descriptive title for your project.
- **Name:** Your name.
- **Overview:** Briefly describe your project goals. From this overview, we should be able to understand what you are going to do and the scope of the project. Be specific about what your input is and what your output is. How will you know if your output is correct; that is, how will you know that you solved the problem.
- **Previous:** What sources (papers, web pages, etc) will you use? What has been done before?
- **Data:** What data will you use? Do you have it? If not, how will you get it?
- **Risks:** What are the biggest unknowns in starting this project? What don't you have or don't you know?

Please hand in a PDF file with your proposal the same way you handed in the assignments. The command to hand in your project proposal is:

```
/course/cs143/bin/cs143_handin proposal
```

What to hand in.

Everyone will hand in a project writeup and their Matlab code and any image data used for experimentation. The exact nature of the writeup is different for undergraduate and graduate students (see below).

You will hand in your assignment with the familiar hand in system. The command to hand in your final project is:

```
/course/cs143/bin/cs143_handin proj
```

Undergraduates and grad students

You will hand in a pdf document describing your project, its goals, related work, and your experimental results. We are not just looking for results. We want to know how you think about the problem, how you formulate it, and how you articulate it. Don't just show us results, but rather use the results to illustrate ideas and to explain the uses and limitations of the method.

We are specifically looking for how you took a problem in the real world and formalized it. What models, abstractions and approximations did you use? State your assumptions clearly. How did you then find a solution using your formulation; that is, how did you optimize?

Where does your method fail? What does that tell you about your assumptions?

Your writeup is the key – it is where you explain the problem and the solution. Your results should illustrate what you did. The graduate student guidlines below may be a help.

We have zero tolerance for plagiarism. If someone else has said something better than you could ever say it, then there is a right way to use their words: you quote

Graduate Students.

All the project requirements above are the same for you. For graduate credit however, you must do a little bit more. One of the biggest factors in a person's research success is their ability to communicate their ideas well. You can be brilliant but if nobody understands you then your work will not make an impact. This part of the assignment gives you experience writing your work up in a format appropriate for publication. IMPORTANT: your project is in no way expected to be publishable work, but your presentation of it should be in the format of a publishable paper and should have the same level of clarity.

In particular, we would like your project paper to conform to the IEEE conference style. A dummy paper can be found at

```
/course/cs143/asgn/proj/dummy.tex
```

and

```
/course/cs143/asgn/proj/dummy.bib
```

If you have never used Latex and Bibtex, please let us know.

We want to see an abstract that is a clear summary of the work, an introduction that says what you did and why it is interesting, and a previous work section discussing what has been done previously and (importantly) how it relates to what you have done. Previous work will be cited and references will appear in the bibliography. Of course, this does not need to be at the level of what is expected in a publishable paper.

Explain your method in clear English. Use equations and figures to communicate your ideas more clearly. When using equations, make sure you define all the terms and explain the notation fully.

Show your results and explain what they mean. Use the results to illustrate the ideas of the paper. Show where the method works but also where it "breaks".

Finally, we want to see clear conclusions about what you did, what worked and what didn't, and how this work might be improved in the future.

We expect your papers to be about 6 pages in the IEEE format. Eight pages is the upper limit and four is probably a lower limit.