

# CS 791 Topics: Mass Detection in Mammograms

## Project Guidelines

Students would be required to work in teams (**two students per team**) to complete a project. The instructors will provide a list of possible project topics for the teams to choose from. Ideally, the project topic chosen by a team should be related to the team's paper presentations. Students who might be interested in working on a different topic (i.e., not among the topics provided) are encouraged to discuss their ideas with the instructors. Upon selecting a project topic (e.g., mass classification), each team would need to experiment with a method related to their topic (i.e., an algorithm for classifying masses in different categories) by applying it to some real data (i.e., links to several popular datasets can be found on the course's webpage).

To successfully complete your project, make sure that: (1) you have a good understanding of the approach used to solve the problem addressed in your project or you are willing to spend the time to better understand it, (2) there is code available, especially if the approach used is complicated to implement, and (3) there is data available for experimentation. You can probably find some good code by exploring several resources such GitHub (code should come from a published paper), paperswithcode.com, GoogleScholar, and by emailing the authors directly.

There would be two targeted goals behind the application of a particular approach to some real data. The **first** goal would be to verify that the approach works. Towards this goal, each team would be expected to test the method using various data sets. The **second** goal would be to identify potential weaknesses/drawbacks of the method chosen, that is, to identify cases where the method might fail to produce good results. You should try to demonstrate this using data that makes the method fail or perform poorly. Identifying ways to improve/extend a given method will earn you **extra credit**, might form the basis for a **MS thesis** or **PhD dissertation**, and can lead to a conference and/or journal **publication**. Therefore, students are highly encouraged to explore new ideas to **improve/extend** a given method or even propose a **new** method.

### Project Deliverables

There will be **four** project deliverables; details and specific deadlines are discussed below.

#### First Deliverable: Project Topic

By **October 2, 2023**, each team should have selected a project topic; we will provide a list of possible project topics in class, but you are also **highly encouraged** to discuss your own ideas with us. The first deliverable will be a short project topic report (to be uploaded on Canvas by **11:59pm**) which should include the project idea along with a summary, a list of 4-5 closely related papers (i.e., papers should tackle the same or a very similar problem)

along with a short summary of main ideas and relation to the project, a list of available code, and a list of available datasets.

## Second Deliverable: Project Proposal

A project proposal should specify a plan of work. By **October 16, 2023** each team should have a clear idea of their main goals and objectives (i.e., what would the team like to achieve and how). Also, each team should have a tentative plan for what data they are going to use and what experiments they plan to perform. The proposal (to be uploaded on Canvas by **11:59pm**) should contain the following sections:

1. An overview section which outlines the project topic, its significance, and the main goals and objectives.
2. A brief review of the project topic (i.e., describe what else has been done in this area, what are the major approaches, and how your approach might be different if you propose a new approach). This should be a review of **4-5** research articles from literature that have addressed the same or a similar topic to the one you have selected.
3. A section on experiment design. This should describe what you intend to do, what data you will use, and what experiments you plan to do. In this section you should identify potential available code, dataset, and experimental tools that you plan to leverage towards your project.
4. A section on the project plan. This should include an itemized list of milestones for completing the project.

Teams are required to give a formal presentation in class (**15** minutes) to discuss their project proposal.

## Third Deliverable: Interim Report

Each team should upload their interim report on Canvas by **November 8, 2023**, at **11:59pm**. By that time, teams should have produced some preliminary results and have a better idea of what needs to be done and how. The interim report proposal will address the same issues as in your project proposal; however, you should include more details now. You should explain clearly what has been done up to this point and what remains to be done. Also, you should also indicate clearly whether any of your goals and or objectives have changed.

Teams are required to give a formal presentation in class (**20** minutes) to discuss their progress.

## Fourth Deliverable: Final Report

Your final report should be uploaded on Canvas by **December 22, 2023**, at **11:59pm**. In some cases, a short extension (1-2 days) may be given for a report addendum that includes new results. Your final report should address the same issues as in your interim report; however, you should include all available details now. You should indicate clearly what you accomplished in relation to your original goals and objectives. If you did not manage to achieve some of your original goals and objectives, this should be stated clearly. You should pay a lot of attention to presenting and discussing your experimental results. You should also include a section containing your conclusions and ideas for future research. Here is an outline for your final report:

1. An abstract summarizing the project and what you achieved.
2. A brief review of previous work.
3. A description of your methods.
4. A description of data that you used and the experiments that you conducted.
5. A section on the results and observations from your experiments.
6. A conclusion, summarizing the achievements of the project and suggestions for future work.

Teams are required to give a formal presentation in class (**30** minutes) to discuss their results.