CSC 872 Pattern Analysis and Machine Intelligence
Spring 2026, Dr. Kazunori Okada
Final Project

Overview: Conduct an independent **literature survey study and presentation** on deep learning (DL). Each student is to choose a subtopic of deep learning and select minimum of five articles describing it (**approved by the instructor before 3/17**), study these articles, conduct **PechaKucha-style short presentation** (**on 5/12**), and submit a **survey report** due on the last class meeting (**on 5/12**). Your work will be graded based on the quality/depth and completeness of your presentation and report. Late policy specified in the syllabus will apply.

Objective: This research assignment provides you with a hands-on exercise for conducting literature review and presentation toward preparing your own thesis and publication, as well as current knowledge in deep learning technologies.

Assignment: A) Read "LeCun, Bengio, Hinton, Deep Learning, Nature, 521:436-444, (2015)", a well-known classic survey paper on deep learning (A copy of this paper can be found on Canvas page). **B)** Choose a subtopic covered in this article. Your subtopic can be a specific concept and how that works/is applied (e.g., distributed representation or ConvNet) or a concrete question (e.g., why distributed representation is advantageous over local representation in DL? or why ConvNet won ImageNet competition in 2012?). **C)** Find more than 5 peer-reviewed academic articles on the subtopic that are either cited in LeCun et al or cited in those cited in LeCun et al. SFSU library provides online services for accessing articles in PDF format free of charge (http://library.sfsu.edu/computer-science-research). Do your best to be thorough in picking the most important papers for your chosen subtopic. Ill-chosen list of papers can limit the quality of your report. Consult your instructor if you have any questions on your paper selection. **D)** Read these articles thoroughly. This should involve reading some more referenced papers beyond those chosen and related textbook chapters in order for you to understand the necessary details covered in the selected articles. **E)** Prepare and submit the literature survey report. Be constructively critical on any major claims/results made by these articles, arguing their shortcomings. Discuss then how one can try to overcome such shortcomings. In reviewing articles, you always want to ask yourself following questions or similar:

- What are the major goals of this study?
- What technical context motivates this study?
- What specific problem/hypothesis addressed?
- What is the basic idea of proposed solution/method/theory?
- Any prior assumptions made limiting the proposed solution?
- Are their experimental design sound?
- Are their experimental results convincing?
- How does this solution compare to others?
- What advantages are there on what condition?
- What disadvantages are there in what condition?

- List reasons why this solution makes sense or no-sense?
- Argue against any claims made?
- If you are to redo this study, how can you improve it?

The report must follow the **SFSU thesis format** specified in the university guidelines (https://grad.sfsu.edu/content/thesis-dissertation-guidelines: a template available under the Step-1 menu at bottom) and should be **around 14 double-spaced pages** (two page introduction, two pages for each paper, four page critique and conclusion, and two page reference list). Your report must include your original writing on the following items:

a) Title and abstract of your report, and your professional affiliation information
b) Introduction/technical context of the specific subtopic you studied in papers
c) Bibliographic citation information and credibility of the author's research group of each selected article
d) Brief summary of proposed methods/contributions by each article
e) Brief discussion on how they relate to the PAMI research subfields covered in this course
f) Detailed critique on the work described in the articles
g) Your logical conclusion(s) based on your above critique
h) Suggestion of most promising strategies for solving your research problem
i) Reference list

F) Prepare and make a short power-point presentation of your final report. **The presentation is to be held on 5/12**. It will follow a general style of **PechaKucha** presentation (http://www.pechakucha.org). Incorporate as much visual examples as you can. **Submit a file of your presentation slides by 5 pm on Sunday 5/10 prior to the presentation**. More details of this presentation will be given later in the course.

Submission & Deadlines:

A) **Due on 3/17, 10 pm:** Finalize and submit short description of your idea/topic and the selected articles (more than 5) via a Canvas Discussion thread.
B) **Due on 5/10, 5 pm:** Submit presentation slides + multimedia files if used.
C) **Due on 5/12, 10 pm:** Submit your final report.

All submissions are handled by the course Canvas page. Please follow the link titled "Final Project Tasks" at the end of the Canvas' homepage. For the presentation slides, please use the MS power point format (pptx or ppt). For your reports, please use the PDF format.

Grading: Your final report will be evaluated on the basis of 1) evidence of learning, 2) correctness, 3) content's merit/depth, 4) writing clarity, 5) completeness. Follow the above instructions carefully to earn a good grade. The paper length is NOT proportional to your grade, but the quality of your report is. Be **concise and punctual, while emphasizing the main findings of your study. The report covers 25% of the total grade, while the presentation covers 10% of the total grade.** The late policy specified in the syllabus will apply to all submissions.