UTS

Week 1
Welcome to 42028

Deep Learning &
Convolutional Neural Network

CRIOCOS code 00099F

Teaching Team

- **Subject Co-ordinator & Lecturer:**

  A/Prof. Nabin Sharma

  Email: Nabin.Sharma@uts.edu.au

- **Tutorial Staff**:
  - Mr. Gitarth Vaishnav
  - Mr. Abishek Sundar
  - Mr. Mostafa M Jalal

Objectives

- Introduction to Machine Learning fundamentals.

- Understand the difference between traditional machine learning and Deep Learning.

- Able to Build, Train, and Test a Convolutional Neural Network (CNN) from scratch.

- Learn to use libraries and framework for implementing Deep CNN architectures.

- Collaboratively Analyze, design, implement and test solutions to real-world computer vision related problems.

Assessment Items

- Assessment Task 1: Assignment-1 (Individual)
  - **Weight:** 30%
  - **Task:**
    1. Implement a Linear classifier using SVM for digit classification
    2. Implement a Linear classifier using Neural Network for digit classification
    3. Compare the implementations in terms of classification accuracy and top choices.
    4. **Dataset will be provided**
  - **Due Date: 11.59pm Friday 22 March 2024 (Week-5)**
  - **Deliverables:** Short Report and code, via Canvas.

Assessment Items

- Assessment Task 2: Assignment-2 (Individual)
  - **Weight:** 30%
  - **Task:**
    1. Customize a standard CNN architecture and reduce/increase the layers. Train and test on image classification task
    2. Implement a custom CNN architecture for object detection and localization.
    3. Train and test the custom architecture on a given dataset for detection of multiple Objects, using object detection methods.

    (Training, validation and testing datasets will be provided.)
  - **Due Date:** **11.59pm Friday 10 May 2024**. **(Week -11)**
  - **Deliverables:** Short Report and code, via Canvas.

Assessment Items

- ## Assessment Task 3: Final Project (Group)

  - **Weight:** 40%

  - **Task:** Any one of the following problems, or any combination:

    1. Design/Implement an image classification algorithm.
    2. Design/develop an object detection system for detecting specific objects in a video and localizing them.
    3. Develop a clear problem statement that is within the capabilities of CNNs and design and capture a dataset of significant size that addresses this problem.
    4. Compare a series of algorithms against each other to determine optimum performance, and then suggest new approaches that improve performance.

    Student must develop a Graphical user interface that allows the operational use of an algorithm to achieve a real-world solution/application and gain hands-on-experience in MLOps

  - **Final Due Date:** **11.59pm Friday 17 May 2024, (Week -12)**
    Oral defence and presentation schedule to be informed later

  - **Deliverables:** Multiple deliverables, via Canvas.

Assessment Items

Assessment Task 3: Final Project (Group)

Deliverable details:

1. Part-A(Report): Group details, Project title and abstract : Week 4, Monday: Weightage 5%

2. Part-B(Report): Dataset details, GUI design plan, Implementation/development plan: Week 7, Monday : Weightage 5%

3. Part-C(Report): Initial experimental results: Week 10, Monday: Weightage 5%

4. Part-D(GUI design/report): Week 11, Monday: Weightage 5%

5. Part-E: Complete project (GUI, experimental results etc.): Week 12, Weightage 40%

6. Part-F: Presentation and Demo, Recorded video: Week 14, Weightage 15%

7. Part-E: Oral Defence: Week 14, Weightage 25%

**For exact dates and submission requirements, please check Canvas

Labs/Tutorials

- **Duration**: 3Hrs
  - 2Hrs (Tutor guided)
  - 1Hr (For project related activities, discussion, feedback, progress reporting, etc.), students to work in groups.

- Implementation of Algorithms using Python

- Google Colab will be used initially, and switch to AWS Sagemaker studio from Week 6

Labs/Tutorials

- Deep Learning frameworks: TensorFlow, Keras, etc.
- Datasets will be provided

Important Tasks:

- Project Groups to be formed by Week-3 Friday.
- Trello/other tools can be used for your project management.

Consultation

- **Schedule**: Every Tuesday, 11:00-12:00 (Via Zoom or face-to-face)

- **Please check Canvas for further details.**

Week 1 Checklist

☐ Checked Subject outline

☐ Zoom link for Lecture and how to join

☐ Aware of my lab/tutorial schedule

☐ Room number for on-campus lab/tutorial session

☐ Have working knowledge of Python (Review materials available on Canvas)

☐ Clear about the assignment deadlines

☐ Clear about the assignment requirements

☐ I know how to use Canvas and can find the subject materials, assignments, FAQs, discussion board, etc.

☐ Prepare questions for having a clear understanding of the subject requirements and expectation.