Cairo University
Faculty of Engineering
Satellite Imagery and Remote Sensing
Spring 2024

Change Detection Project

Project Overview

This document provides the framework for the change detection project for the Remote Sensing and Satellite Imagery course. Students will apply classical and deep learning techniques to detect changes in satellite imagery, critically analyze their results, and understand the practical implications of their findings.

Objective

To implement and benchmark classical and deep learning methods for change detection in satellite images, with the goal of identifying changes accurately.

Project Requirements

Techniques:

Apply suitable preprocessing to the images provided and implement change detection algorithms.

- **Classical Technique:** Each team must implement and document at least one classical change detection technique (Image Differencing, Ratioing, CVA, ...).

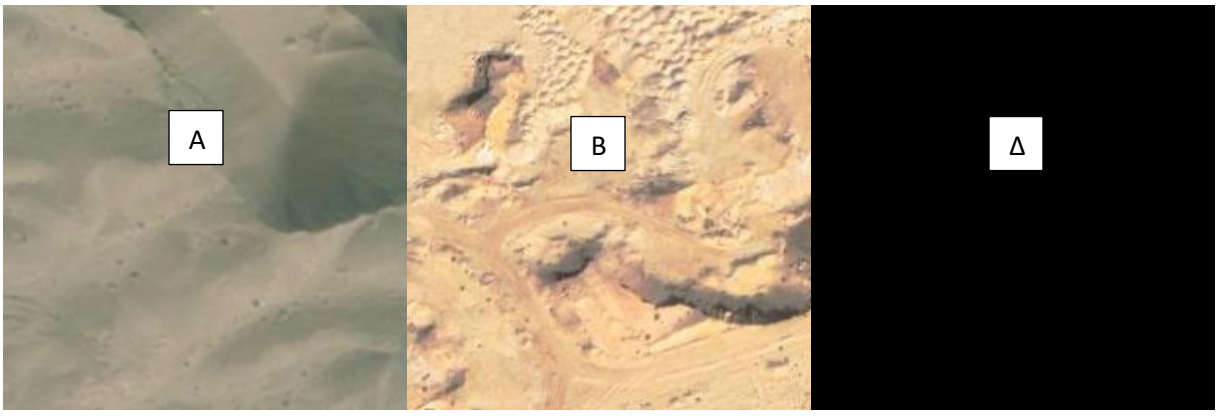
- **Deep Learning Technique:** Teams are also required to implement and document at least one deep learning approach for change detection (CNN, U-Net, Siamese Net, ...).

Teams:

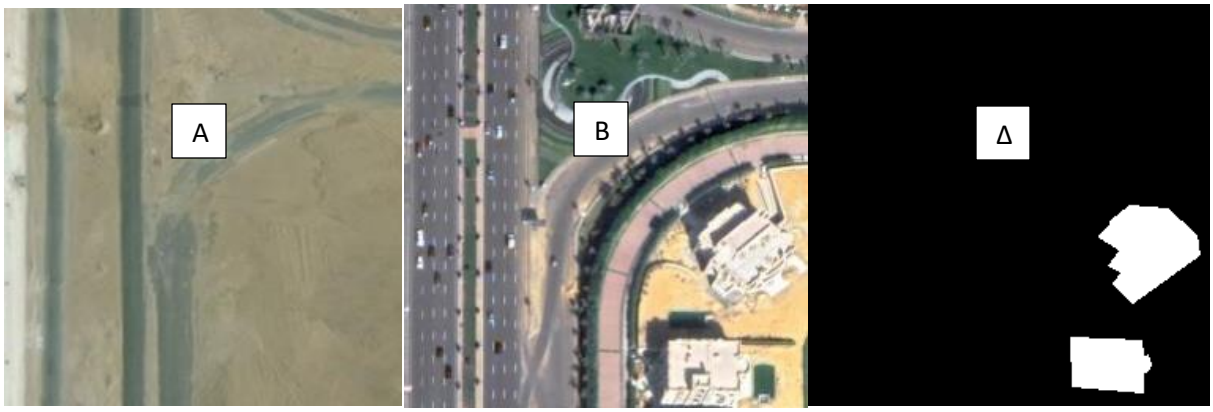
- The project will be completed in teams of four. Team collaboration is essential.

Dataset:

You will be provided with group of images of some sites (group A) then the image after a while (group B) and the ground truth for difference.



1 Sample for no change in a site



2 Sample for change

Results and Ranking:

- Teams will be ranked based on the **Jaccard Index metric** to evaluate quality of their change detection results, with grades assigned across 3-4 tiers.

Submission Platform:

- Submissions will be made via the Kaggle platform. Instructions for Kaggle submission will be provided.

Project Timeline

- **Project Launch:** 27/03/2024

- **Test Set Release:** To be announced, one day before the final project submission or during the discussion session.

- **Final Project Submission:** 15/05/2024

- **Results Announcement:** 20/05/2024

Submission Details

Each submission must include:

- A detailed report of the methods used, dataset division (training and validation), and rationale for the techniques chosen. The report must include the performance analysis and results evaluation for both classical and deep learning techniques implemented and how it affected the final model whether classical, deep or hybrid.

- The code for the classical and deep learning methods.

- Predictions on the test set, formatted as per Kaggle competition standards.

Evaluation Criteria

Projects will be judged on:

- The accuracy and efficiency of the implemented methodologies.

- The clarity and comprehensiveness of the project report.

- The performance on the test set, based on the competition rankings.

Students are encouraged to be innovative and are expected to thoroughly explore different methodologies for change detection. The ultimate objective is to gain a deeper understanding of the capabilities and limitations of various change detection techniques in the field of remote sensing.