Group 17- Fall 2024

ENGG 680 – Introduction to Digital Engineering Group 17- Fall 2024			
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Group contract

Communication:

What's the primary way of contacting each other remotely (text, email, etc.)?

- Text, Email and WhatsApp group chat.

Response time:

How quickly do you expect group members to respond?

- Withing 1 hour.

Meetings:

Which day and what place works best for everyone? If there is not a day or place, how do you decide when and where to meet?

- Tuesdays and Thursdays at the University work the best for everyone.
- If there is not a day or place, we discuss through the WhatsApp group chat to see when and where to meet. Most likely besides Tuesdays and Thursdays, the meeting will be online via Zoom.

Division of Labour:

How will you ensure cooperation and equal/fair distribution of tasks?

- By dividing individual task equally after a constructive decision

Accountability:

What are the team expectations regarding attendance, punctuality, participation, preparedness, task completion, deadlines, communication with the team, commitment, etc.?

- The team expects consistent attendance, punctuality, participation, task completion according to set time, clear and open communication and commitment to meeting deadlines.

Decision-Making:

How will you vote on key decisions (consensus, majority, secret vote, etc.)?

- Decisions will be arrived through a group consensus. If there is a situation requires otherwise, then a majority vote will be used.

Conflict Resolution:

What happens when team members violate one or more terms of the contract, or their work doesn’t meet the team expectations?

- If a team member doesn't fulfill their obligations or meet expectations, we'll address the issue directly, provide constructive feedback, and if necessary, escalate the matter to a supervisor or a mediator.

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Project Summary

Title:

Urban Expansion and Land Use Monitoring Using Custom Machine Learning Models

Aim:

Analyze how urban areas grow and how land use changes over time by developing and training a custom machine learning model that processes satellite imagery.

Engineering problem the project aims to solve:

This project aims to address the challenge of monitoring and managing rapid urban expansion and its impact on land use patterns. Understanding how cities grow and how land is being used is crucial for sustainable urban planning and environmental management.

Libraries and machine learning models used:

Python Libraries: We will use pandas (for data manipulation), matplotlib (for data visualization), geopandas (for handling geospatial data), scikit-image (for image processing), rasterio (for reading satellite imagery), and scikit-learn (for machine learning algorithms).
Machine Learning Models: We will develop and train a custom Convolutional Neural Network (CNN) for image segmentation to detect land use patterns. The CNN will be built from scratch and trained on satellite imagery to classify different types of land use such as urban, agricultural, and forested areas.

Datasets Used:

We will use open-source satellite datasets such as Sentinel-2 Satellite Data and USGS Landsat Data. These datasets provide high-resolution images that can be used to analyze land use changes over time.

How This solution is relevant to the field of Engineering:

This project bridges the fields of geomatics and civil engineering by using machine learning models for geospatial analysis. The insights generated from tracking urban growth and land use changes are crucial for infrastructure planning and sustainable development. This project will demonstrate how machine learning can be applied to address real-world challenges in urban planning and environmental management, offering data-driven solutions for engineers and planners.