رواد مصر الرقمية

وزارة الاتصـــــالات
وتكنولوجيا المعلومات

Project Title: Land Type Classification

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Date: [Date of Presentation]

10/14/24

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Project Idea

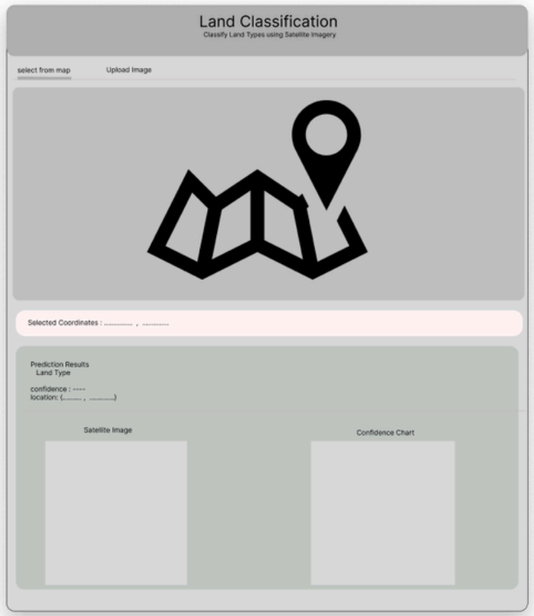
The Land Type Classification using Sentinel-2 Satellite Images project focuses on analyzing real satellite imagery of Egypt.
The system uses deep learning techniques to classify regions into land categories such as Agriculture land , forest, water bodies , and more.

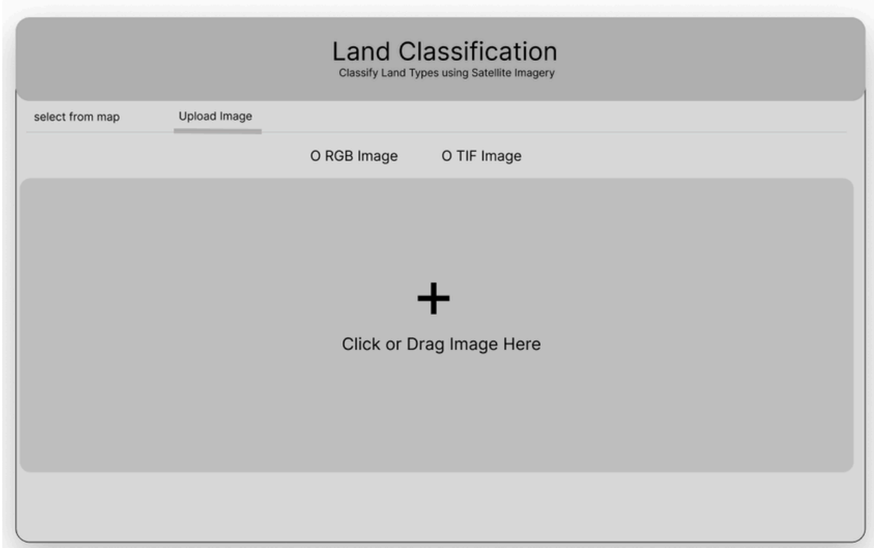
To improve performance and adapt to different images formats , the project includes
Two Independent Classification models:

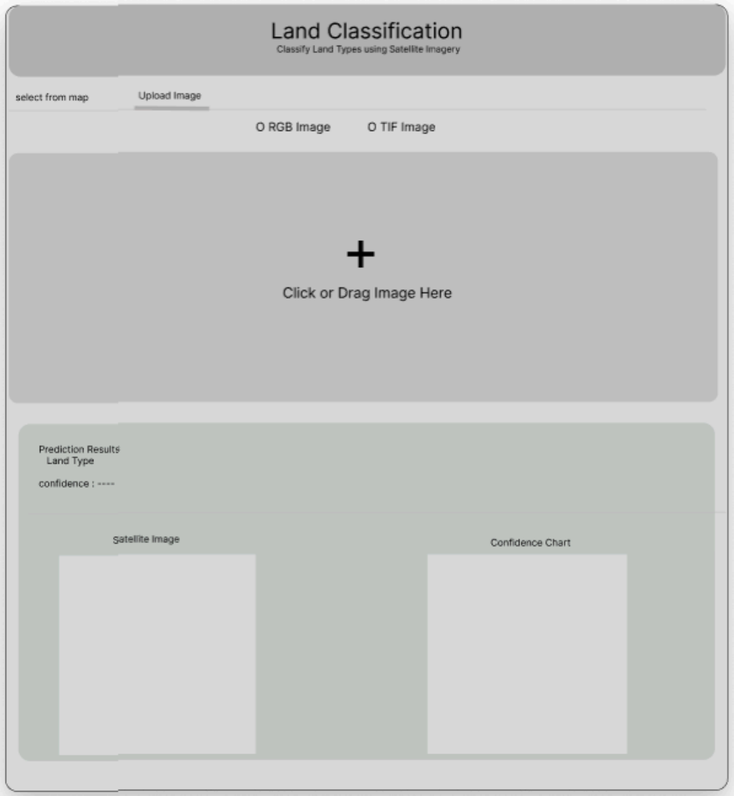
1- RGB based classification model for standard 3 channel satellite images.
2-TIF based classification model for multispectral Sentinel-2 imagery

Project Wireframe

User interfaces:







User Flow:

1. Start → Choose input method
2. Upload image / Select map point
3. Model inference
4. Display result + visualization

UX Highlights :

- Simple UI for non-technical users
- Two input options (map, upload)
- Clear loading state & errors
- Visual result and confidence
- Responsive design & mobile friendly
- Smooth transitions and animations

End Users + Features

End Users:

- Remote sensing analysts & researchers
- Environmental & agricultural authorities
- Urban planning organizations
- GIS / ML students and developers

Key Features

- Two classification models: one for TIF, one for RGB
- Simple Flask web interface for image upload & output visualization
- Supports both satellite spectral bands and standard RGB images
- Fast model inference for near real-time results

Value to Users:

- Provides accurate land-type predictions
- Easy-to-use UI allows non-technical users to analyze images
- Flexible input formats make the system widely applicable

Data Structure

Database architecture:

We use EuroSAT datasets to train our land-type models.
DataSet Structure:
1) **EuroSAT (RGB) Folder** Contains RGB images collected from the Sentinel Dataset.
2) **EuroSATallBands (Multispectral) folder** Contains .tif files which have all the bands of the spectrum as collected from the Sentinel-2 satellite,
each folder contains:

- 10 class folders

(1-Annual Crop 2-Forest 3-Herbaceous Vegetation 4-Highway 5-Industrial 6-Pasture 7-Permanent Crop 8-Residential 9-River 10-Sea Lake)

- train.csv / test.csv / validation.csv
- label_map.json

Data Flow :

1-Dataset acquisition:

We downloaded the EuroSAT dataset from Kaggle.

2-Storage:

Images stored in folders by class:
Labels stored in CSV files

Programming Languages + Frameworks

Modeling:

Languages:
Python

Frameworks & ML Tools:
TensorFlow / Keras (Deep Learning model training)
Scikit-learn
NumPy / Pandas

Visualization & Data Tools:
Matplotlib
Rasterio / TIFfile)
OpenCV

Supporting Tools:
tqdm (progress tracking)
logging (process tracking(

Deployment:

Programming Languages:

- Python
- JavaScript
- HTML & CSS

Frameworks & Libraries:

- Flask
- TensorFlow / Keras
- scikit-learn
- Leaflet.js
- Matplotlib
- tifffile

External Platforms & APIs:

- Copernicus Sentinel-2 API : Provides real satellite imagery based on geographic coordinates.
- Hugging Face Hub

Live Application + Test

Live Application

The current system is deployed as a live Beta version and is accessible online for real-time land classificatio

Testing

Basic functionality has been manually tested by the team
Sample input images were used to validate predictions
Ongoing improvement based on team-observed results

Initial feedback indicates:

- The interface is easy to use.
- Predictions are accurate for most land-type categories.
- Some suggestions were made for faster processing and support for larger image resolutions.

Deliverables

Technical documentation :

Technical Report (system architecture, model description, preprocessing pipeline)

Dataset Description Document.

Project Deliverables

- Fully working application deployed on Hugging Face
- Source code repository (provided ZIP)
- Final project presentation (this file)

Timeline

Week 1–2 (Milestone 1): Data Collection, Exploration, and Preprocessing
Week 3–4 (Milestone 2): Model Development and Training
Week 5–6 (Milestone 3): Model Optimization and Performance Tuning
Week 7–8 (Milestone 4): Real-Time Model Deployment and Visualization
Week 9–10 (Milestone 5): Final Documentation and Presentation

Project Team

Team Memper	responsibilities
Rawda Yassin (Team Leader)	Model Development and Training
Alshimaa Ahmed	Real-Time Model Deployment and Visualization
Malak Hany	Data Collection, Exploration, and Preprocessing
Menna Elhadidy	Final Documentation and Presentation

Thank you
for your time and attention.