DAKHEEL
Smart Invasive Bird Detection System

دخــيــل

جامعــة أم القــرى
كليــة الحاسبــات

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ABSTRACT

Aligned with Vision 2030's biodiversity enhancement goal, this project introduces a smart detection model to **monitor**, **detect**, and **classify** invasive bird species, issuing notifications to relevant authorities. **Invasive birds** are non-native species that cause ecological, economic, and health damage. They are a major factor in one-third of recent animal extinctions and cost an **estimated $1.5 trillion in global environmental damage annually.** Our detection model **achieves 93% accuracy in detecting invasive birds, enabling early detection and rapid response to protect native species and ecosystems.**
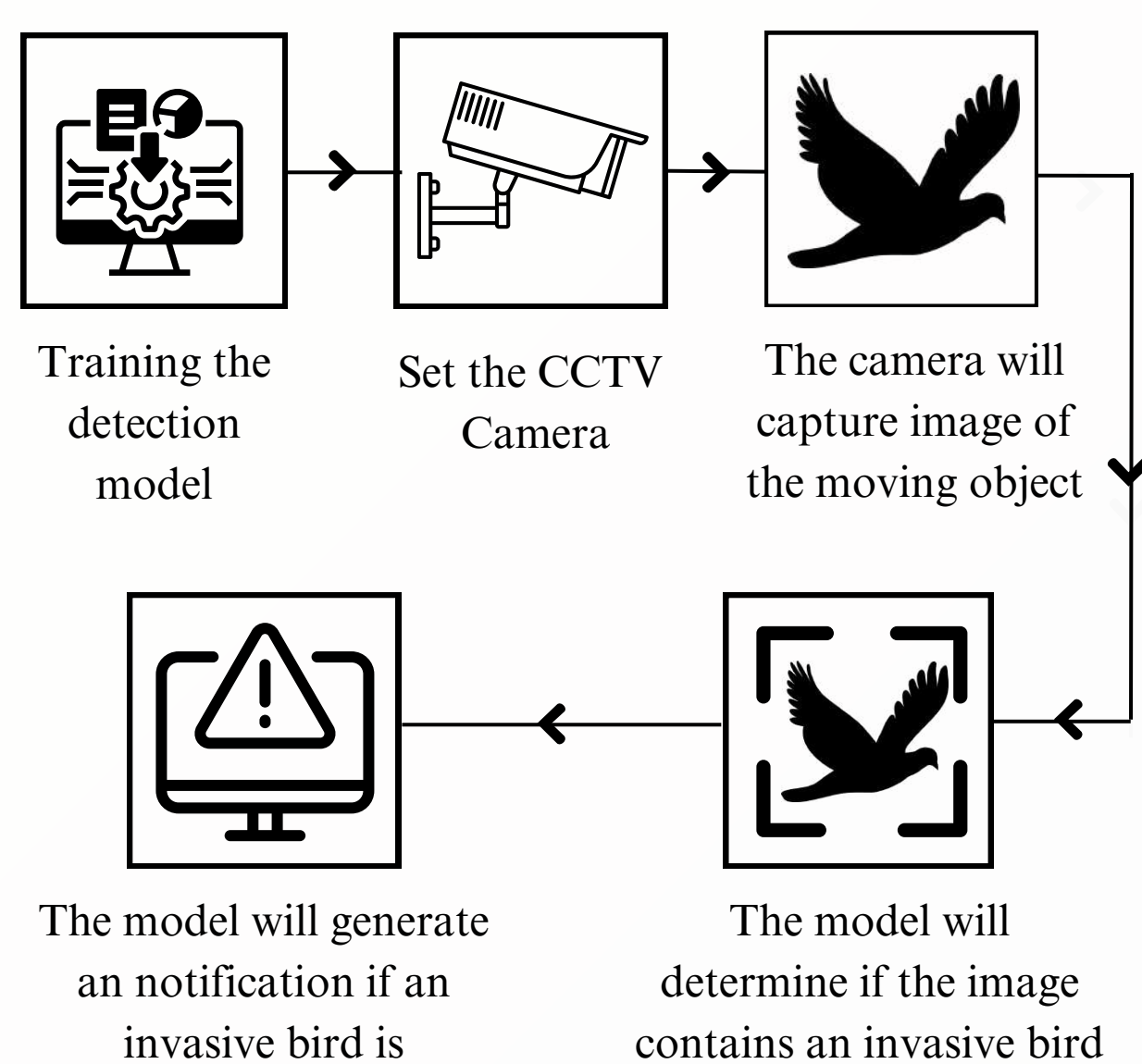
OBJECTIVES

- Detect, classify and monitor the spread of these birds in real-time.
- Preserve the natural environment and protect the ecosystem from the harmful effects of invasive species.
- Ensure the sustainability of natural resources for future generations in line with the Vision 2030 initiative.
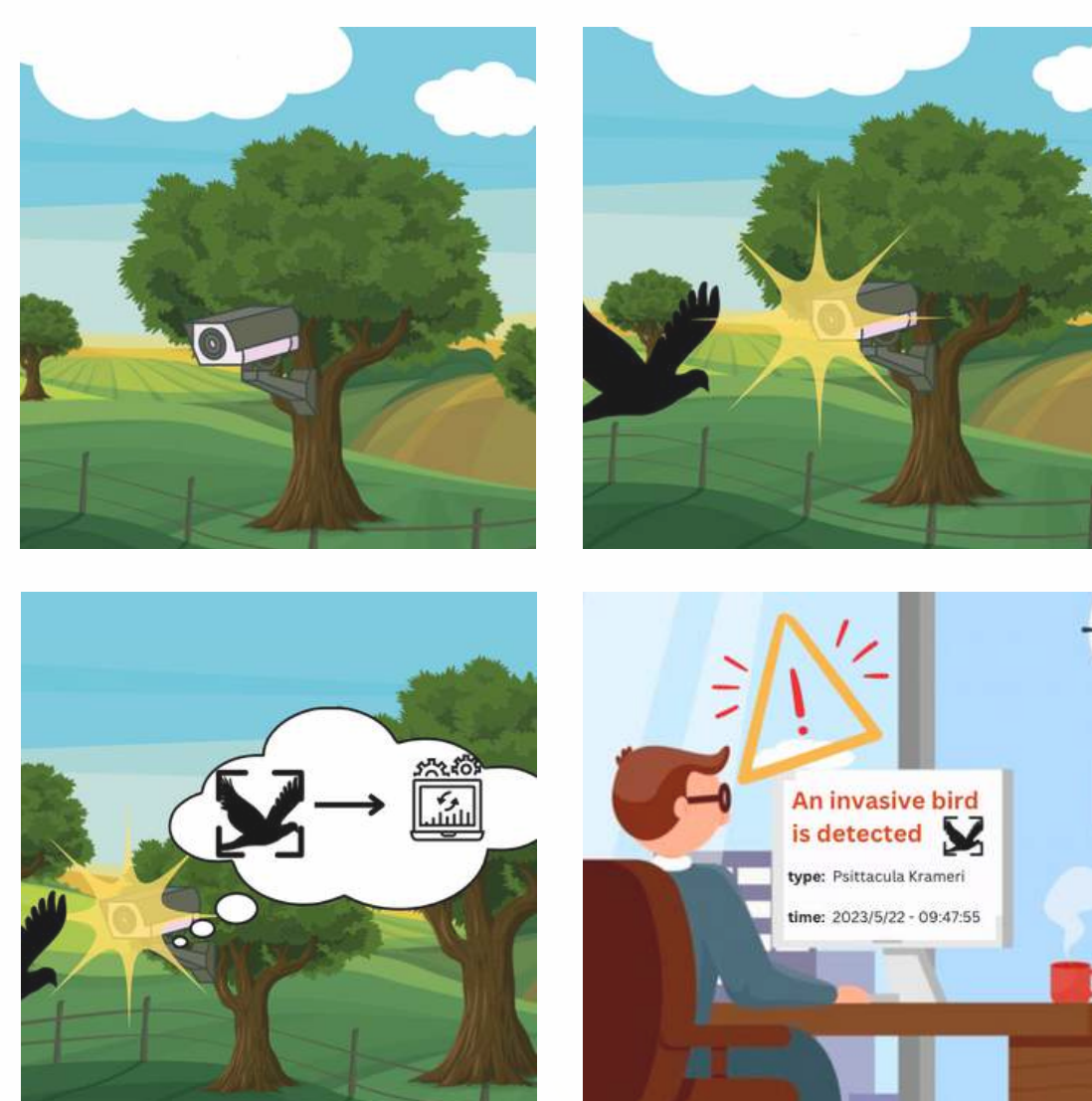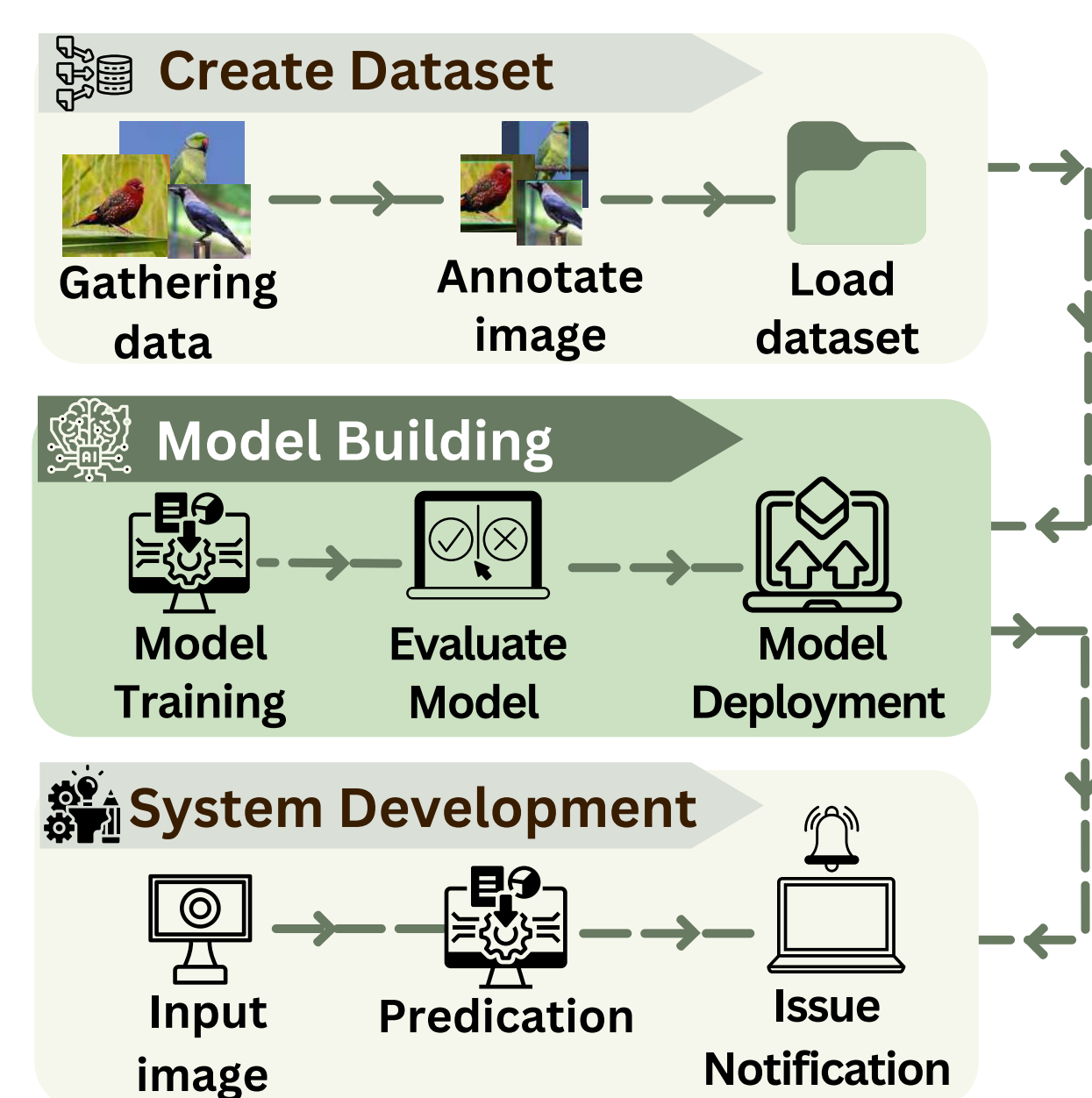
TOOLS

YOLOv8 · jupyter · Python · VS Code · CO

System Architecture

Training the detection model → Set the CCTV Camera → The camera will capture image of the moving object → The model will determine if the image contains an invasive bird → The model will generate an notification if an invasive bird is

How System Work

METHODOLOGY

Create Dataset
Gathering data → Annotate image → Load dataset

Model Building
Model Training → Evaluate Model → Model Deployment

System Development
Input image → Predication → Issue Notification

RESULTS

		Accuracy	Precision	Recall	F1-Score
	Amandava	0.99	0.978	0.994	0.985
	Common-Myna	0.928	0.979	0.867	0.919
	Corvus-splendens	0.928	0.904	0.756	0.824
	Pisttacula-Krameri	0.928	0.837	0.932	0.881
	Red-Vented-Bulbul	0.983	0.964	0.949	0.956

Dakheel system achieved an mAP 93.5% with threshold = 0.5 on the test dataset.

CONCLUSION

Dakheel System is a promising new tool for the detection and classification of invasive birds in Saudi Arabia. The system has the potential to significantly contribute to the protection of the environment and economy in the Kingdom of Saudi Arabia. The system can be used to monitor the spread of invasive birds and to take early action to prevent them from causing damage using Dakheel's notifications.