

# This project demonstrates how **Convolutional Neural Network object detection models** can be used to successfully **identify and classify** different species of **bees** for ecological research, aiding in the **bee species conservation**.

## Computer Vision-based bee species classification

### INTRO

- Supporting vital research and conservation efforts by the Social Insects Research Group (SIRG) at the University of Pretoria.
- Explore the fascinating world of bees using the cutting-edge YOLOv8 CNN object detection model and image augmentation to enhance our dataset for accurate identification.

### METHODS

- Data Collection and Augmentation:** Dataset collection through a web-scraping script to capture ~1000 images of different species of bees.
- Augmentation:** utilizing augmentation through shearing, brightness, rotation, width, and height shifts.
- Model Development:** Utilized the YOLOv8 CNN object detection model.
- Evaluation and Validation:** Conducted performance evaluations using metrics such as F1 score, precision, recall, confusion matrices and many more.
- Visualization and Deployment:** Created a deployed computer vision model for identifying the species of bee in any image and created an augmentation visualization using Streamlit.

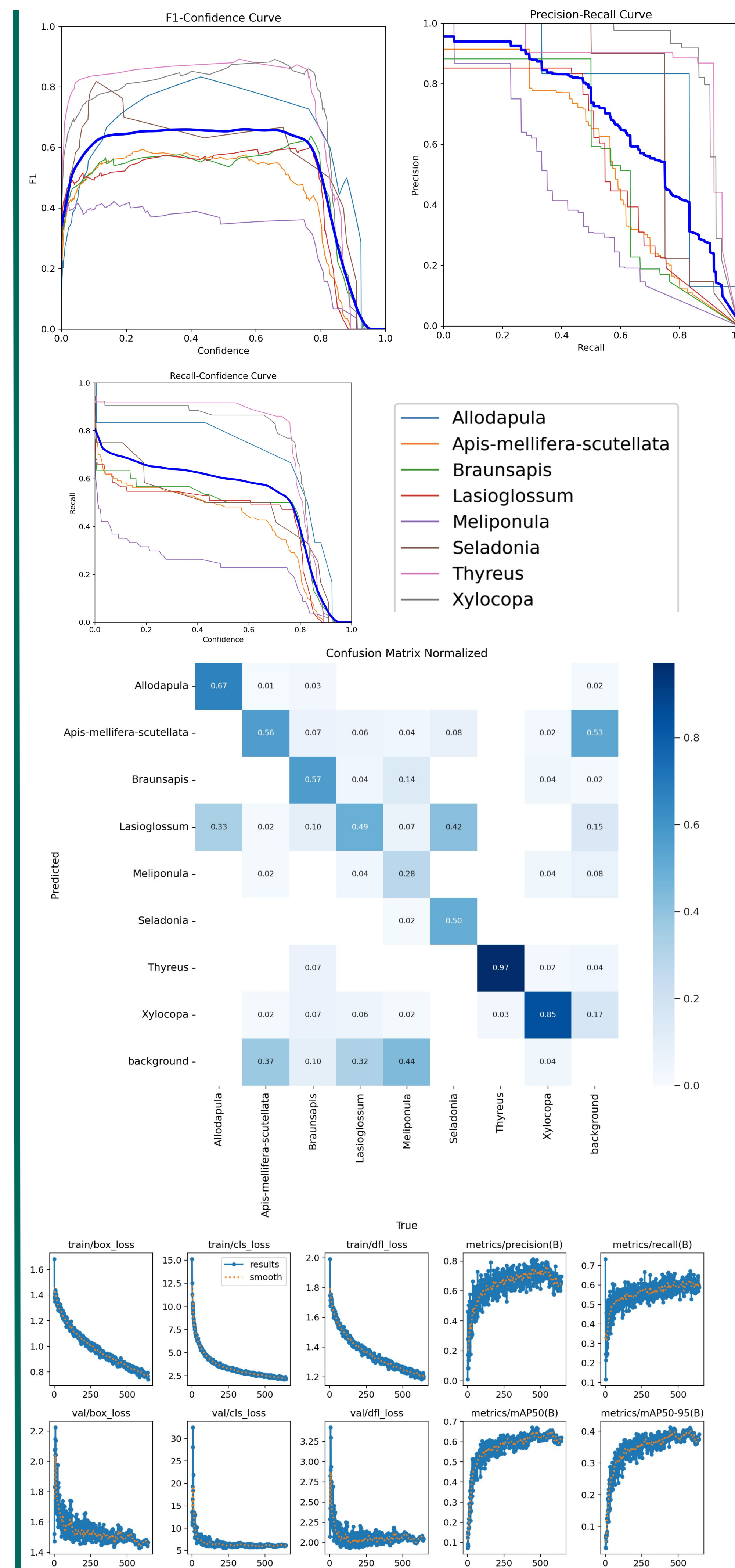
 Hanno Jacobs, Yasekwa Dutywa

### RESULTS



### DISCUSSION

Our work shows that object detection models such as YOLOv8 can accurately identify and classify different types of bees. We also found the most useful augmentation techniques that help the model to classify the different bees. Useful augmentation techniques include shearing, brightness, rotation, width, and height shift. Types of augmentation that don't work are augmentation techniques that change colour.



### Keywords



Department of Computer Science

Faculty of Engineering,  
Built Environment and  
Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en  
Inligtingtegnologie / Lefapha la Boetšenere,  
Tikologo ya Kago le Theknolotši ya Tshedimošo

Capstone Project - MIT 808

Course Coordinators:

Dr. Vukosl Marivate (vukosl.marivate@cs.up.ac.za)  
Abiodun Modupe (abiodun.modupe@cs.up.ac.za)

