



Object detection:DJI Tello Drone Face Detection

FACE RECOGNITION USING TELLO DRONE

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INTRODUCTION

- In the realm of computer vision and artificial intelligence object detection is a task that involves identifying and locating objects in images or videos.
 - The goal is to recognize and locate objects and provide information about these objects and possibly classify them into predefined categories.
 - This is achieved using various algorithms, models and computer vision techniques.
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- This project explores the use of object detection, with a particular focus on human faces to control drones. We explore how drones respond to individual's faces around them by using mobileNet pre-trained models and SSD.



OBJECTIVE

The drone should be able to detect a person's face and move around by following them.



Steps taken to achieve our objective

- Build a machine learning model for real time object detection
- Train and test the model using provided or collected dummy data and optimize it for best performance.
- Integrate basic drone controls and Object detection with the Machine Learning model.
- Testing



General outline of how to customize pre-trained models

- Data Preparation
- Data Augmentation
- Select a Pre-trained Model (MOBILNETV2)
- Import the Pre-trained Model
- Freeze top Layers
- Remove Final Layers Add New Layers
- Compile the Model
- Train
- Hyperparameter Tuning
- Evaluation
- Deployment

Key Components

Dji tello drone:



pyCharm IDE





Key Components

Face Detection Model:

At the heart of our project is the Face Detection Model. This deep learning model is responsible for identifying and locating human faces within the live video feed captured by the drone.

Control Algorithm:

The Control Algorithm serves as the decision-making mechanism for the project. It takes the information obtained from the face detection and mask detection models and translates it into actionable instructions for the DJI Tello Drone.



Notable Achievements

Our project, "DJI Tello Drone Face Detection" has yielded remarkable results and notable achievements. Through the integration of advanced technologies and creative problem-solving, we've achieved the following outcomes:

- Real-Time Face Detection
- Efficient Mask Detection
- Precise Face Tracking
- Human-Drone Interaction



Face Detection Model

- Our project is based on a pre-trained MobileNet architecture. MobileNet is known for its efficiency and suitability.

To empower our face detection model, we incorporated two critical files:

- `res10_300x300_ssd_iter_140000`: These pre-trained weights enhance the MobileNet-based model's ability to recognize faces within the live video frames.
- `deploy.prototxt`: The prototxt file defines the model's architecture and configuration. It serves as a blueprint, outlining the network's layers, their connections, and the model's specifications.



Control Algorithm

Summary of what CONTROL ALGORITHM script does:

- Connect to the DJI Tello drone, enable video streaming.
- Define a function (detect_and_predict_face) for face detection and mask prediction using face detection model
- Initialize video Stream From Tello Drone Camera and Enter the Loop where the script continuously captures frames from drone camera
- The script displays the video stream with bounding boxes around detected face and labels indicating if it is face covered or just FACE
- If face is detected , it calculates the centre of the detected face and its area. And the adjust the drone speed and movement to follow the face.
- It allows you to quit the script by pressing the 'q' key, which lands the drone and closes the video window.



Challenges

- Multiple faces appeared simultaneously in the video frame
- Delay in video frame updates
- Power Management
- Integration
- Obstacle Avoidance
- Privacy and Legal Considerations when testing the drone.



CONCLUSION

In Conclusion:

Our "DJI Tello Drone Face Detection & Tracking" project represents the convergence of cutting-edge technologies and innovative ideas. It has showcased the potential for deep learning, computer vision, and drone technology to work together in real-world applications.

The project demonstrate the successful real-time detection and tracking of human faces, even in dynamic and challenging environments.



Live Demonstration

1. Demonstrate multiple face detection using Phone Camera.
2. Demonstrate detection of face mask using phone camera
3. Connect tello drone and detect face using drone camera
4. Demonstrate takeoff and landing
5. Demonstrate face drone control