Real Time Human Detection For Search and Rescue Operation In Post Conflict Area (UNIFIL) using UAV Platform

Final Presentation

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Introduction

- The United Nations Interim Force in Lebanon (UNIFIL) is a demilitarized zone created after the conflict between Lebanon and Israel

- One of the top ten conflict areas in 2018.

Objective

- To develop the algorithm which is used to detect the human in the post-conflict zone using the UAV platform by acquiring visual and thermal imageries.

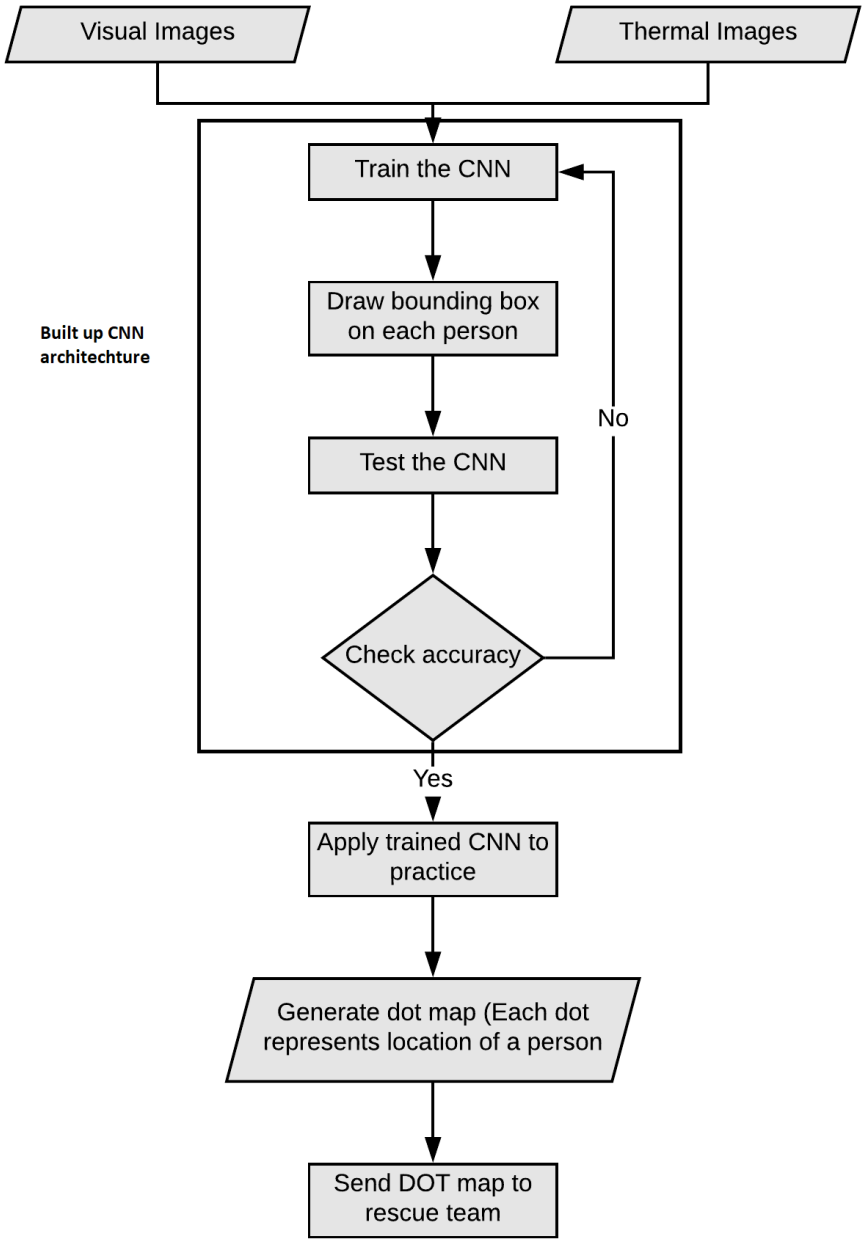
Role : Research Institute

- To create near perfect CNN algorithm for Human detection.
- Testing and validation of the algorithms.
- Training the UN & troops to operate the UAVs and interpret the dot map (final deliverable)
- Actively participate in helping the UN to build the infrastructure for the mission.

Requirement

- Example : Dji Phantom 4
- Flying height : 100 m (it can be controlled by the pilot later)
- GSD – around 5 to 10 cm

Flowchart



Built up CNN architechture

Method

Why we choose CNN?

- Traditional approaches need a “dictionary”, like enumeration
- Deep learning is faster and more accurate than traditional approaches

How to use CNN?

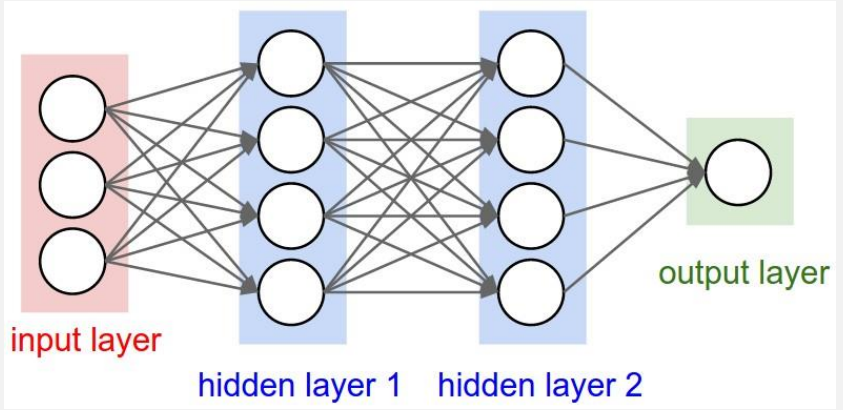
① Input layer:
- Thermal images and visual images

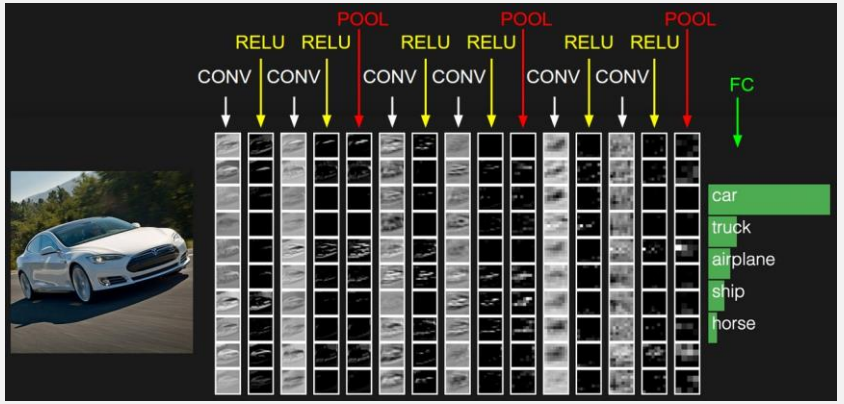
② Hidden layer:
1. Linear transformation (use a kernel)
2. Rectified linear units (use a threshold)
3. Maximum pooling
4. Repeat above 3 steps

③ Fully connected layer
- To analyze the probability of human

④ Output layer:
- Conclude is this a human or non-human

⑤ Draw a bounding box on each detected person





Deliverable

Dot map

- One to one dot map
- Each dot shows a coordinate (x,y) of each detected person.

Limitations

- Battery life of UAV is around 28 minutes.

- The algorithm has been created only for open space keeping in mind the limitation of the drones and the camera's capability. Further research can be done to improve this.

thank you