

Prevention of the spread of viral disease using artificial intelligence from data obtained by UAVs

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The aim of this article is to create a model for sensing and measuring the body temperature of people in public spaces so that the global impacts of COVID-19 on the economy and society are reduced.



Introduction

- Today, the rapid spread of COVID - 19 infectious diseases due to globalization is a major threat.
- COVID-19 is infectious disease caused by the new coronavirus SARS-CoV-2, which began spreading in December 2019 from the Chinese city of Wuchan.
- The disease has symptoms and course very similar to more severe influenza (the most common symptom is fever).
- There is a need to reliable monitor people's body temperature, in entrance of buildings can measure temperature by static thermal detectors – problem is measure temperature in public places.



Methodology

- Identify people with elevated body temperature in outdoor areas, where it is impossible to guard all access roads to the place - global problem such as infectious diseases.
- UAV flight control with a thermal camera.
- Deep learning methods are used for subsequent image processing and classification.



Methodology - UAV

- UAV (or drone) is an unmanned aircraft system that can be controlled remotely by an operator or fly independently using pre-programmed flight plans.
- UAV is a low-cost solution for fast data acquisition and can carry multispectral camera (thermal and visible).
- For qualities data is necessary get planning flight (reduces data redundancy).
- Planning flight is managed by rules for capture data, it is 60 % of row overlap and 25 – 30 % transverse overlap.

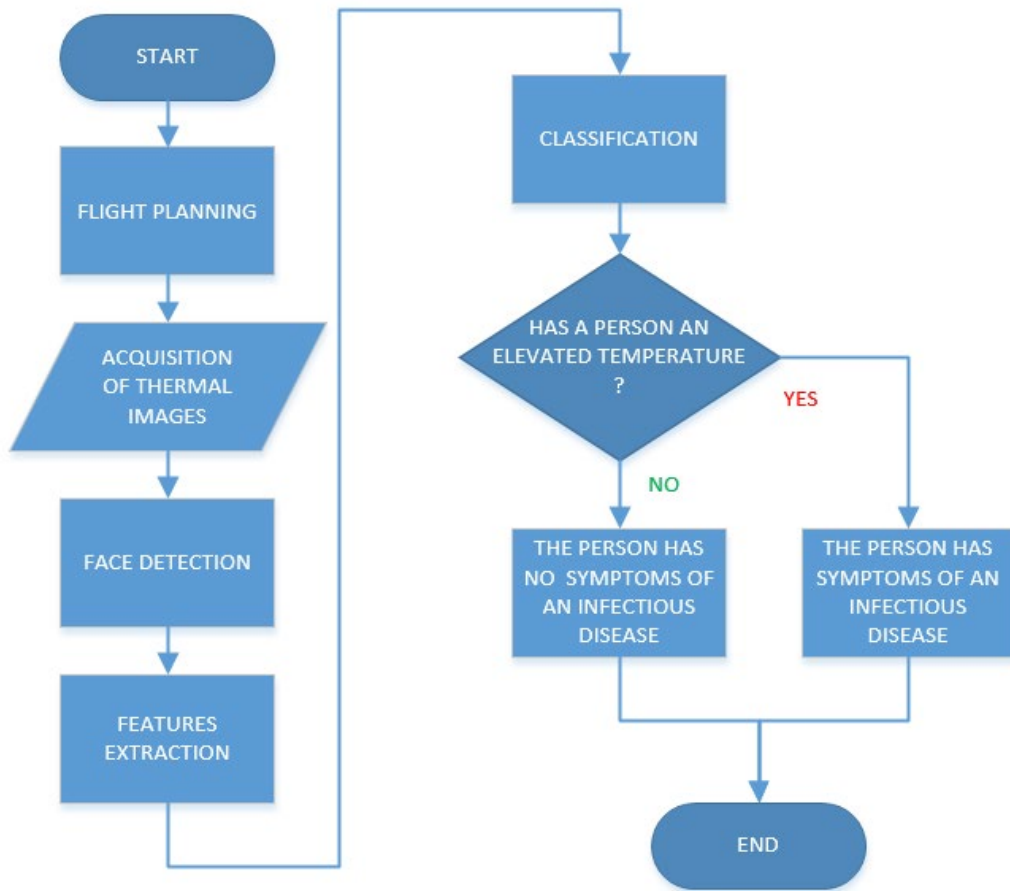


Methodology – Deep learning

- It is necessary to detect the faces of individual persons in the images obtained during the controlled flight.
- Classification of persons into two categories:
 - increased body temperature,
 - normal body temperature.
- Faster R-CNN detector for face detection.
- Convolutional neural network GoogLeNet is used in the classification model.



Results - Flow chart of the proposed model



- Flight planning of UAVs with a thermal camera.
- Thermal images of persons are obtained, from which faces are detected using a Faster R-CNN detector.
- Features extraction and following classification into two groups by CNN (GoogLeNet).



Discussion

- Use of UAVs with a thermal camera to monitor people in public places to identify people who have a fever, which is a symptom of many infectious diseases.
- Convolutional neural networks are used for classification.
- Further research:
 - focused on contact retrieval,
 - use a better thermal camera.



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Thank you for your attention

