Poster: Flood Monitoring using Computer Vision

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1. INTRODUCTION

Urban floods have become a constant threat to human life and property. Also, high resolution cameras in smart phones have become ubiquitous. This work involves using Computer Vision [1] [2] algorithms to estimate the depth of flooding based on images taken by the general public which are geo-tagged and time-stamped. This approach will help in the implementation of effective and timely urban flood relief and management. This data can also be used to assess the effectiveness of preventive measures taken in the past and to plan remedial measures in the future.

2. OBJECTIVE

Estimate the water level in a flooded region using the human height as reference. Steps [Figure 1] :

- Detection of human face and segmenting the human part in the image using deep learning algorithm. Human segmentation [3] helps to find the pixel position of the water line.
- Classify each detected human face as male or female and use average male/female height as the reference.
- Assume the human height to be 8 times that of the bounding box around the face (Golden Ratio).
- Once the pixel positions of the human feet (where the extrapolated bounding box ends) and the water line are known, they can be used to estimate the water depth.

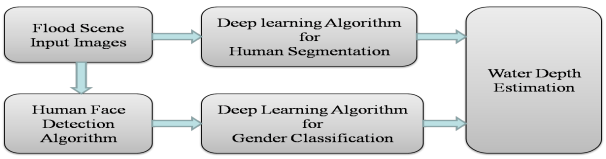

Figure 1: System Architecture

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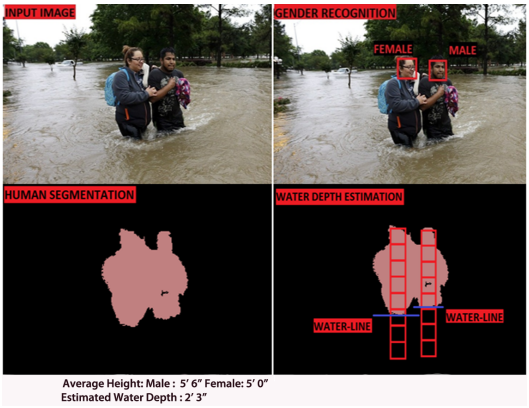

Figure 2: Water Depth Estimation

3. EXPERIMENTAL RESULTS

The steps involved in flood depth estimation and the results obtained are shown in Figure 2.

4. CONCLUSION & FUTURE WORK

In this work, Computer Vision is used to estimate the flood water depth based on images of humans wading through water. One challenge in this approach is that human face detection algorithm may fail with low resolution images. Possible future work includes:

1. Water segmentation to find the water line.
2. Further refinement of the reference human height based on detection of age, ethnicity, etc.
3. Water depth estimation based on reference height of other objects such as vehicles, buildings, electric posts, etc., in the image.

5. REFERENCES

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