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Interactive comment on "Scalable Flood Level Trend Monitoring with Surveillance Cameras using a Deep Convolutional Neural Network" *by* Matthew Moy de Vitry et al.

Anonymous Referee #2

Received and published: 2 April 2019

Thank you for inviting me as a reviewer for the manuscript titled Scalable Flood Level Trend Monitoring with Surveillance Cameras using a Deep Convolutional Neural Network.

General comments: This paper proposed an approach to monitor flood level trend using DCNN. The topic is very interesting. However, in my opinion, it could be difficult for modelers, decision-makers and city planners to use the Static Observer Flooding Index (SOFI) directly. The authors should clearly explain what the direct or specific application scenarios of SOFI are. If SOFI or visible area of the flooding can be converted into water depth value or even class information on water depth, it would make

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this approach more useful and valuable. Unfortunately, this paper lacks this attempt, so I suggest rejecting this paper but encourage resubmission after the improvements have been made.

Some specific comments are reported below: 1. Page 1, Line 16 “The results suggest that the approach can be used with almost any surveillance footage “. I think this conclusion may be too strong.

2. Some new related references about automatic water level monitoring with surveillance images should be included to strengthen this paper. Wang, R. Q., Mao, H., Wang, Y., Rae, C., & Shaw, W. (2018). Hyper-resolution monitoring of urban flooding with social media and crowdsourcing data. Computers & Geosciences, 111, 139-147. Jiang, J., Liu, J., Cheng, C., Huang, J., & Xue, A. (2019). Automatic Estimation of Urban Waterlogging Depths from Video Images Based on Ubiquitous Reference Objects. Remote Sensing, 11(5), 587. Bhola, P. K., Nair, B. B., Leandro, J., Rao, S. N., & Disse, M. (2019). Flood inundation forecasts using validation data generated with the assistance of computer vision. Journal of Hydroinformatics, 21(2), 240-256.

3. Page 4, Figure 1. There should be a “surveillance images” box between “camera” box and “deep conv. network” box.

4. Page 4, Line 18. Why U-net was selected for water segmentation?

5. Page 6, Lines 18-20. In the augmented strategy, how many images were used to train the U-net model? Is the augmented data the same amount as the basic data? Moreover, Page 7, Table 1, the augmentation steps in the augmented strategy should be clearly explained.

6. Page 7, Lines 5-6. It is not accurate enough. How many seconds or minutes does each model training take?

7. Page 8, Table2. The total frames or minutes and the resolutions of surveillance images should be given. How to define the quality of surveillance footage should be

explained.

8. Please add the average segmentation time of a single frame for the testing as a performance, since the real-time monitoring is usually important.

9. Page 9, Lines 16-17. The authors should explain more extensively how to compute the rank of each signal value.

10. Page 9, Line 20. “the two signals” should be clearly identified as the SOFI signal and the reference signal.

11. Page 12, Figure 6. Only the case of video FloodXCam5 was given, please add cases of parking lot and park that are the typical scenes of urban flooding.

12. Page 14, Line 2. “the visually estimated flooding intensity” and “Flooding intensity” in Figure 8 should be consistent with “the visually estimated water level” in the caption of Figure 8.

13. In the “Discussion” section, more comparisons with other existing methods for urban flooding information extraction from surveillance images should be added.

14. The accuracy of this approach could be affected by camera inclination and manual labeling. Topography can also affect the accuracy, e.g., in flat areas, the visible area of the flooding varies greatly, but the change of water depth value may be very small, while in low-lying areas, the change of visible area of the flooding is small, but the change of water depth value may be very big. These error sources should be discussed in the “Discussion” section.

15. In the “Conclusions” section, the authors should explain the direct applications and managerial implications of this approach.

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