I. **Introduction**

A. Usefulness of crowdsourced geographic information in flood research in general.

B. Remotely sensed image versus crowdsourced images.

C. What is flood water segmentation and and its challenges?

II. **Related Work & Contributions**

A. Present Witherow paper and why such approach is bad in practice.

B. **Thesis:** Flood water segmentation is possible from just a single image and without any assumptions on the crowdsourced flood image

C. Summarize the paper structure.

III. **Flood Water Segmentation**

A. Detail the goal of image processing and computer vision algorithms for this problem.

B. **Horizon Line Detection for Flood Images**

1. What is HLD? How has it been applied?
2. **Edged-based HLD**
   a. **Algorithm**: Edge detection with Hough transformation
3. **Drawbacks of Edged-based HLD**
   a. Does not work if water horizon is not the most prominent edge.
   b. Example image with problem.
   c. Not applicable to nonlinear water horizon unless you employ fancier methods.
4. **Region-based HLD**
   a. Briefly discuss what is region-based HLD and define superpixels
   b. **Algorithm**: SLIC/SLICO
5. **Drawbacks of Region-based HLD**
   a. Number of clusters to set is unclear and can have widely different results.
   b. Specularity is a big problem.
   c. Example image with problem.
6. **Semantic Segmentation for Flood Images**
   a. What is the current state-of-the-art approach in computer vision for segmentation?
   b. What is convolutional neural networks (CNN) and how it is different from the traditional approach?
   c. **Algorithm**: Fully Convolutional Neural Network (FCN) trained on PASCAL-Context
7. **Improving FCN Approach**
   a. Transfer learning and finetuning on labeled flood images

IV. **Conclusion**

V. **References**