

IowaRain: A Statewide Rain Event Dataset Based on Weather Radars and Quantitative Precipitation Estimation

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Outline

- Problem Definition
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Problem Definition

- Environmental disasters such as flooding, hurricanes have serious consequences in terms of money and human life.
- Better environmental planning and management is possible through better environmental modeling.
- To address climate change we need extensive environmental modeling.



Tackling the Problem

- Physical and data-driven modeling need data
- There are not many dataset that could be used for benchmarking [1, 2]
- IowaRain aims to be a step towards better environmental monitoring with machine learning by providing a go-to dataset

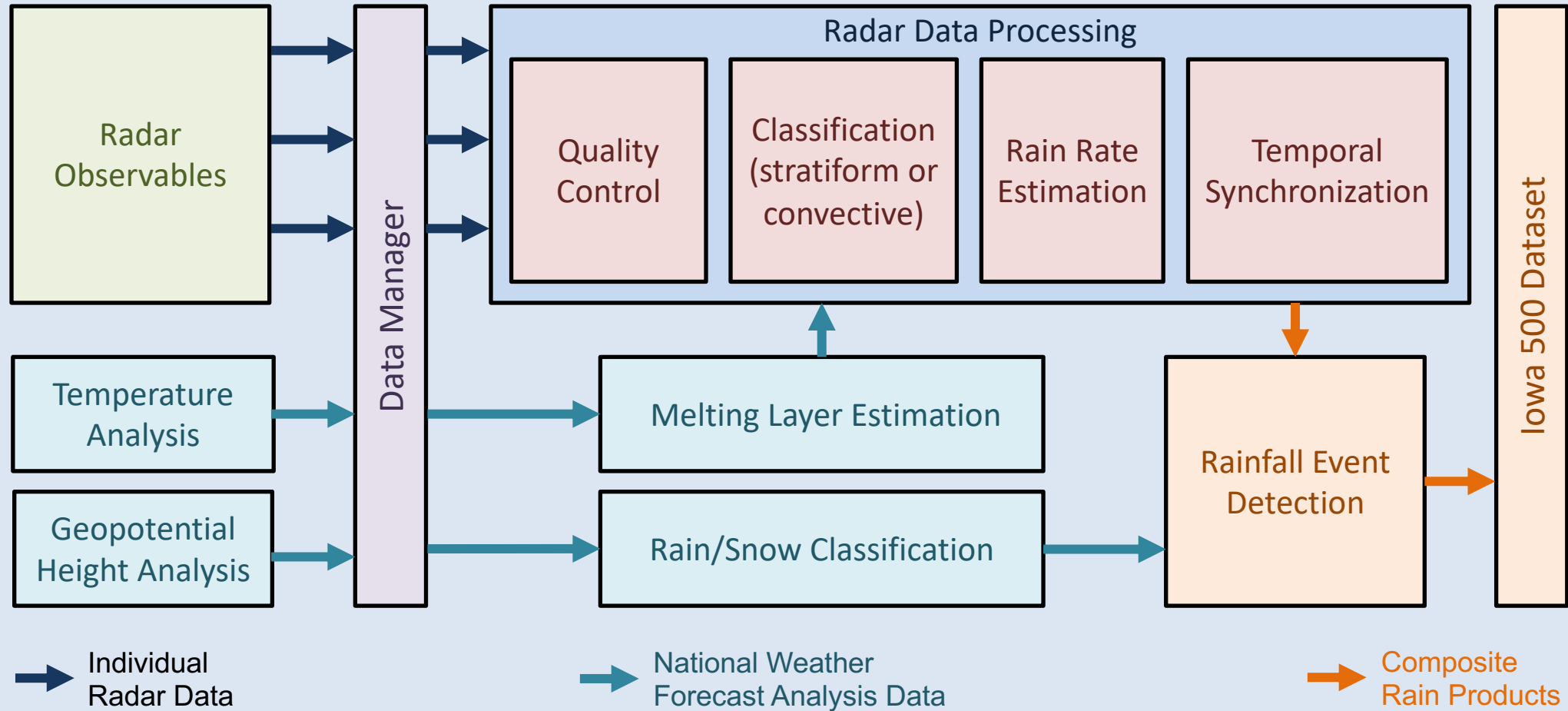


IowaRain

- A rainfall event dataset with the temporal resolution of 5 minutes
- Covers the state of Iowa with a buffer zone circling the state
- Comprises total 288 events from 2016 to 2020
- Vastly relies on national Weather Surveillance Radar (WSR) System NEXRAD [3]



Data Acquisition





IowaRain – Event Criteria

- From 246,528 total snapshots of rainfall, in order for a set of snapshots to be classified as an event;
 - All snapshots in the set must be consecutive
 - The set must consist of at least ten snapshots
 - Each snapshot must have at least 0.5 mm/hr precipitation over %10 of the domain



Summary Statistics

Year	Number of Events	Avg Event Length	Min Event Length	Max Event Length
2016	64	7.09 Hours	50 Minutes	29 Hours
2017	67	6.55 Hours	50 Minutes	29 Hours, 15 Minutes
2018	76	8.04 Hours	50 Minutes	33 Hours, 55 Minutes
2019	81	7.09 Hours	50 Minutes	17 Hours, 40 Minutes



References

1. Ebert-Uphoff, I., Thompson, D. R., Demir, I., Gel, Y. R., Karpatne, A., Guereque, M., Kumar, V., Cabral-Cano, E., and Smyth, P. A vision for the development of benchmarks to bridge geoscience and data science. In 17th International Workshop on Climate Informatics, 2017.
2. Sit, M., Demiray, B. Z., Xiang, Z., Ewing, G. J., Sermet, Y., and Demir, I. A comprehensive review of deep learning applications in hydrology and water resources. *Water Science and Technology*, 82(12):2635–2670, 2020.
3. Seo, B.-C., Keem, M., Hammond, R., Demir, I., and Krajewski, W. F. A pilot infrastructure for searching rainfall metadata and generating rainfall product using the big data of nexrad. *Environmental modelling & software*, 117: 69–75, 2019.

Thank you

<https://github.com/uihilab/IowaRain>

Any questions?