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Rainfield Monitoring and Extracting Natural Phenomena Combining CML with Graph Signal Processing

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Measuring natural phenomena through opportunistic sensing is crucial for maximizing the use of existing data for research and weather warning systems. This research is an addition to existing work that has been done connecting CML information with rainfield monitoring.
by integrating this signal attenuation-based rain estimation with graph signal processing techniques we can gain better rainfield monitoring and extract natural phenomena from anomalies in the graph.
In this approach, graph vertices represent receiver (RX) measurements positioned at the midpoint of CML, functioning as single-point rain sensors. The edges and weights of the graph are determined by geographic proximity and correlation relations, establishing strong relationships between nearby and similar nodes.

By applying graph signal processing, this research aims to:
1. Detect anomalies in the graph, where anomalous links may indicate regions with heavy rainfall potential that could lead to floods (extract natural phenomenon).
2. Improve rainfield monitoring from the graph connectivity and build better interpolation.
3. Clustering the graph into meaningful categories:
3a. Differentiating rain intensity levels.
3b. Distinguishing between urban and rural rainfall characteristics.
4. Optimize computational efficiency, selectively utilizing only the most relevant CML to reduce power consumption and filter out redundant information.

This methodology has the potential to enhance existing rainfield monitoring based on CML information.

Are you an Early Career Scientist ?

Yes

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