Literature Mapping and Reflection

Topic Chosen:

Flood Area Segmentation

Process:

Using ResearchRabbit, I explored literature related to flood area segmentation, focusing on modern computer vision approaches and datasets. I identified two recent and highly relevant papers:

1. Savitha et al. (2025) – Consistency Regularization for Semi-Supervised Semantic Segmentation of Flood Regions from SAR Images
 - Proposes a semi-supervised learning framework using teacher–student models, pseudo-label generation, and consistency regularization for flood detection in SAR imagery.
 - Addresses the lack of large annotated datasets by leveraging self-supervised learning for the teacher model and combining labeled and pseudo-labeled data for the student model.
 - Demonstrates improved segmentation performance compared to several baselines while being computationally efficient.

2. Fawakherji et al. (2025) – DeepFlood: Inundated Vegetation High-Resolution Dataset for Accurate Flood Mapping and Segmentation
 - Introduces a high-resolution, multi-modal dataset (optical + SAR) with detailed class labels including inundated vegetation, a difficult and underexplored flood category.
 - Provides extensive georeferenced aerial and satellite data from major flood events (Hurricanes Matthew & Florence), with semi-automated and manually corrected masks.
 - Benchmarks multiple segmentation architectures (UNet, UNet++, PSPNet, etc.) and demonstrates the benefits of combining SAR with optical data.

Reflection:

Before finding these papers, my search was largely centered on traditional flood mapping methods or general semantic segmentation without considering:
 - Semi-supervised approaches for overcoming data scarcity.
 - The importance of multi-modal datasets (SAR + optical) for robustness in varied conditions.
 - The specific challenge of segmenting inundated vegetation, which plays a crucial role in environmental and agricultural impact assessment.

 Exploring these works reshaped my literature review by:

- Expanding my focus from fully supervised CNNs to semi-supervised and teacher–student frameworks that address real-world annotation limitations.
- Highlighting the value of dataset creation and curation (DeepFlood) as an equally important research contribution alongside algorithm development.
- Suggesting a combined research pathway: leveraging the DeepFlood dataset with semi-supervised segmentation techniques for improved flood mapping in complex terrains.

These additions refine my research direction, making it more aligned with current state-of-the-art methods and practical disaster management needs.

How ResearchRabbit Improved My Research Work:

Using ResearchRabbit significantly enhanced the quality and scope of my literature search in the Flood Area Segmentation domain. Initially, my search was limited to a few known keywords and familiar sources, which risked overlooking novel approaches and datasets. ResearchRabbit's visual literature mapping allowed me to:
- Discover recent, high-impact papers (e.g., Savitha et al., 2025 and Fawakherji et al., 2025) that were directly connected to my area of interest but had not yet appeared in my initial keyword-based searches.
- Identify thematic clusters — it revealed related research on semi-supervised segmentation, multi-modal flood datasets, and inundated vegetation mapping, which I might have missed otherwise.
- Track citation networks — seeing which papers were citing or being cited by my seed articles helped me quickly pinpoint influential works and avoid spending time on less relevant studies.
- Spot interdisciplinary links — it connected me to works from both computer vision and environmental sciences, encouraging a more holistic research perspective.

Overall, ResearchRabbit streamlined my search process, broadened the scope of my review, and ensured my study builds on cutting-edge, highly relevant research rather than older or tangential sources.