

Preserving Fairness of Deep Learning Under Environmental Changes

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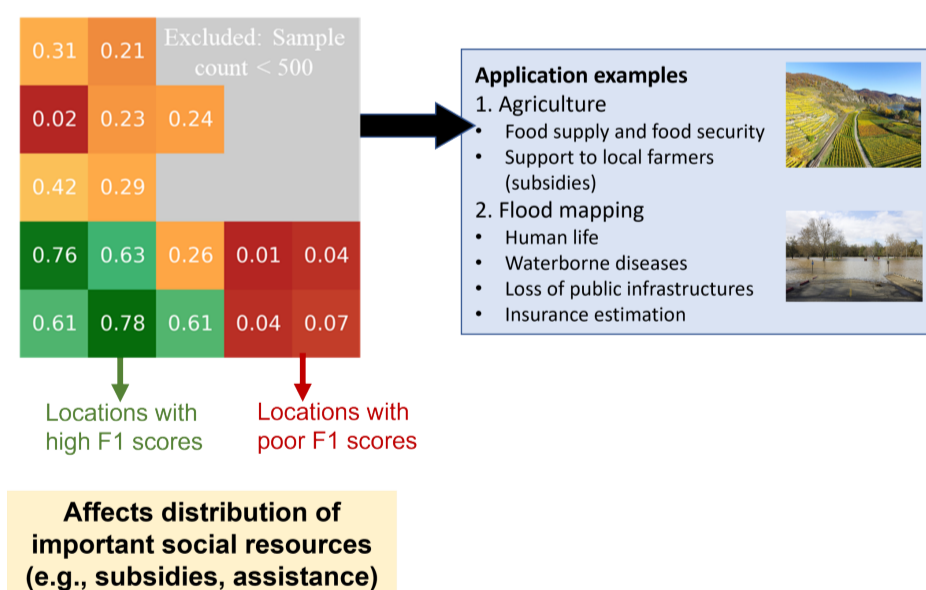
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Motivation

- This proposal aims to develop new spatially-explicit deep learning frameworks by leveraging accumulated physical knowledge and new optimization algorithms to preserve spatial fairness under long-term environmental changes.

Project Description

- Incorporate accumulated knowledge about underlying physical processes to preserve the model performance under environmental changes.
- Fairness objective and optimization:
 - (1) by resolving the data quality and data quantity issues
 - (2) by exploring new bi-level methods to optimize the fairness



Transforming deep learning to preserve spatial fairness under environmental changes

Project Deliverables

- New deep learning framework for decoupling spatial regions with spatial bias
- New training strategies for preserving spatial fairness
- New pipeline to integrate domain knowledge with knowledge

Potential Impact

- Greatly benefit the domain of machine learning and data science in building fair models.
- Provide fair solution to many important societal applications, such as agricultural monitoring and flood mapping, to ensure fair distribution of social resources.

References

- [1] Xie, Yiqun, Erhu He, Xiaowei Jia, Weiye Chen, Sergii Skakun, Han Bao, Zhe Jiang, Rahul Ghosh, and Praveen Ravirathinam. "Fairness by "Where": A Statistically-Robust and Model-Agnostic Bi-level Learning Framework." In *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 36, no. 11, pp. 12208-12216. 2022.

