CPS: Medium: Connected Federated Farms: Privacy-Preserving Cyber Infrastructure for Collaborative Smart Farming

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https://www.nsf.gov/awardsearch/showAward?AWD_ID=2212878&HistoricalAwards=false

Project Goal

Developing and testing an analytical framework that allows for collaboration between agricultural farms, preserves data privacy, and encourages simultaneous collaboration and personalization in data-driven modeling of agricultural farms.

Challenges

- *In-silo* AI-enabled data analytical modeling in agricultural farms limits generalizability of models.

- Sharing the data with a server to construct generalizable models is possible but causes data-privacy concerns.
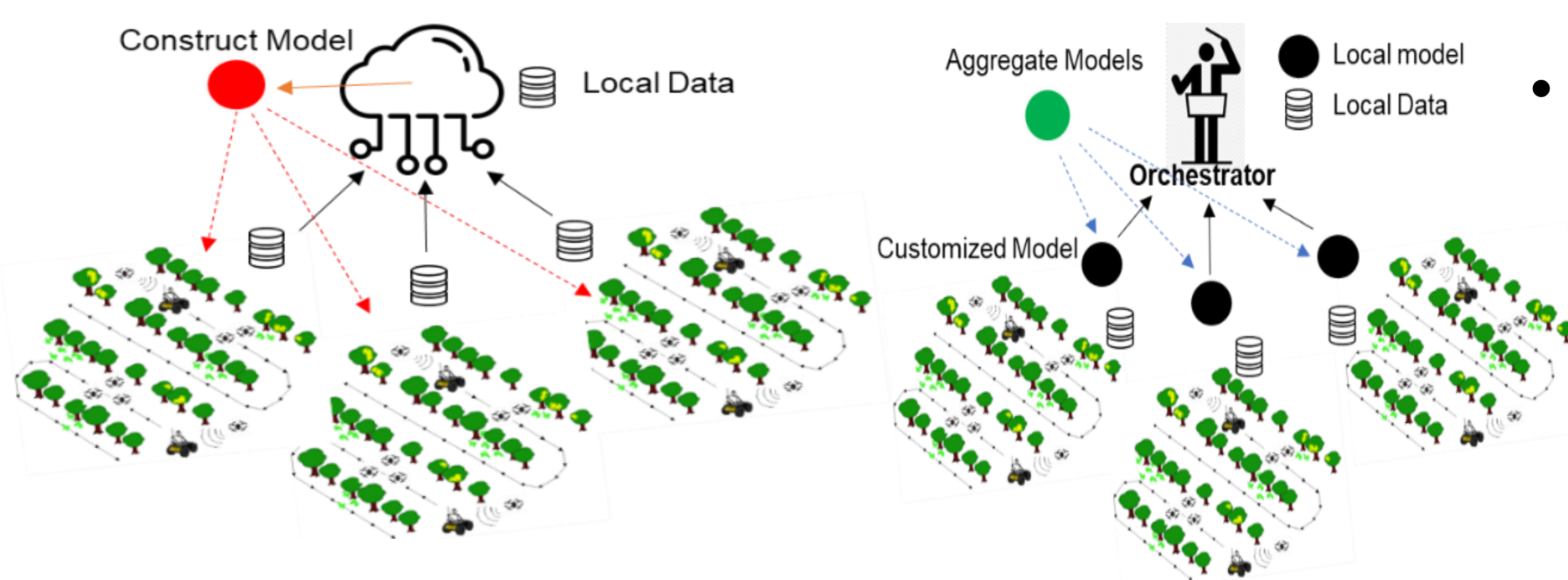

Solutions

- Develop a **federated modeling framework** that allows for sharing knowledge but keeps the data private.

- Use multi-task approaches to handle heterogeneity

- Develop privacy preserving data analytical algorithms using LD representation of HD data.

Scientific Impact:

- The proposed methods and algorithms can be applied to data-rich distributed cyber-physical systems, including infrastructure systems.

- The project contributes to developing generalizable and personalized high-dimensional data analytics.

- The project contributes to privacy-preserving data analytics.
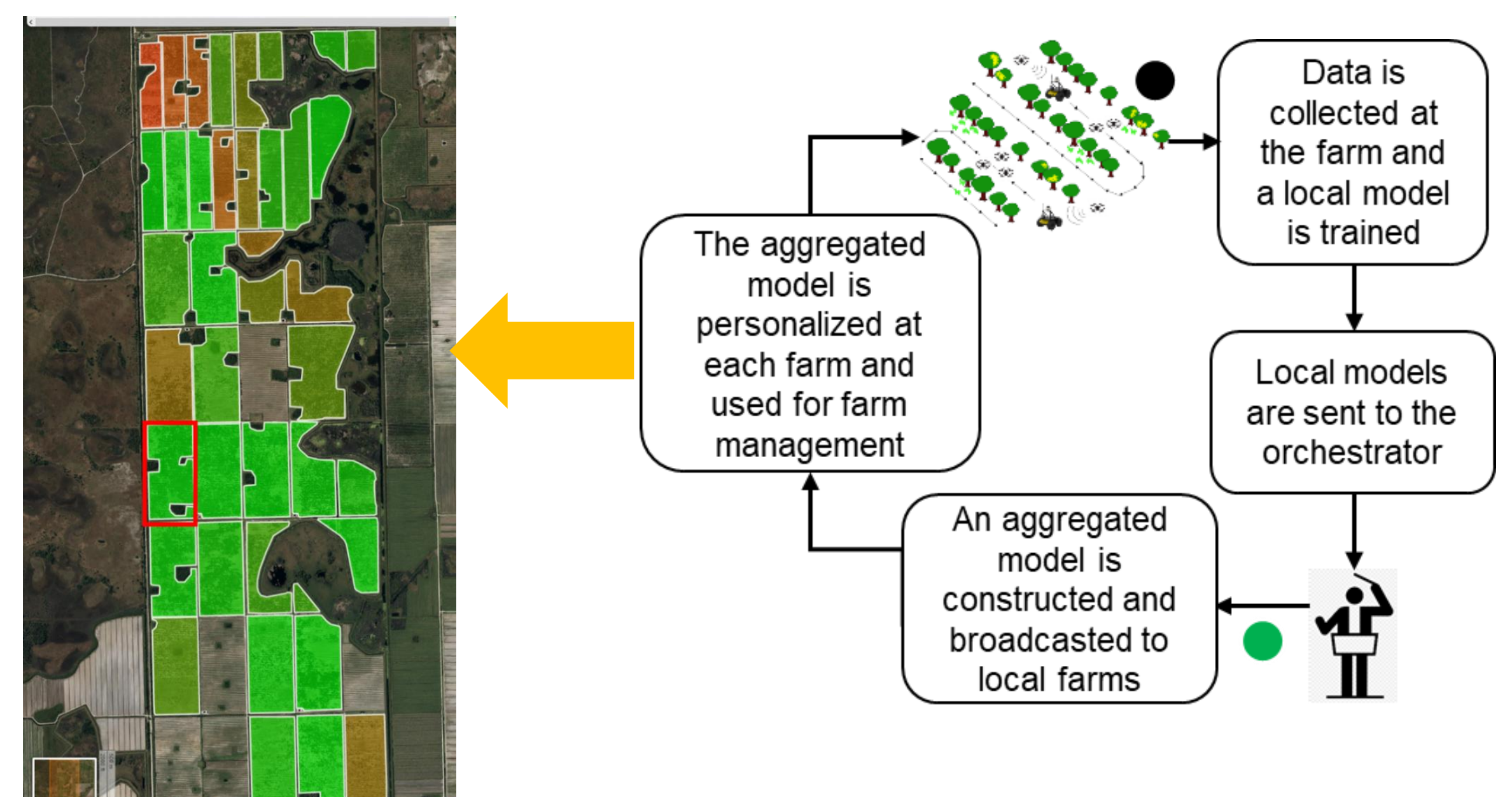
- Test and analyze the algorithms on real data sets collected at multiple farms.

Broader Impact

- Addressing growers' data privacy concerns that hinders the uptake of digital tools can result in improved farm management.

- Developing a prototype multi-farm digital twin

Broader Impact

- Outreach and extension activities through meeting with growers.

- Educational presentations for graduate, UG, and college students.

- High school students research activities.

Broader Impact

- Number of presentations and participants.

- Before and after survey of students about their knowledge in the field of CPS and data privacy.

- Surveying growers on their willingness to use the tools.