

Application of Modeling and Simulation in Food Security Enhancement: Optimizing agricultural output and distribution

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CS361: Introduction to Modeling and Simulation

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Application: Optimizing agricultural output and distribution

Focus: Enhancing global food security through advanced simulations

Relevant Software:

- CropSystem: Crop simulation model for managing water, nutrients, and crops
- APSIM (Agricultural Production Systems Simulator): Predicting crop production in varying environments.
- Stella: System dynamics modeling for food supply chains

Research Highlights:

- Climate change impact simulations on crop yields
- Water resource management through hydrological models
- Supply chain optimization to reduce food wastage

Job Market Trends:

- Increasing demand for agricultural data scientists
- Roles: Agricultural economist, environmental modeler, supply chain analyst

Progress:

- Improvement in yield predictions under varying climatic conditions
- Effective strategies for pest and disease management
- Development of resilient food supply networks

Limitations:

- Uncertainties in climate projections affecting model accuracy
- Limited data availability in underdeveloped regions
- Complexity in integrating multidisciplinary data sources

Future Possibilities:

- Enhanced real-time data integration for dynamic modeling
- Adoption of AI and IoT for precision agriculture
- Greater collaboration between governments and tech firms for data sharing

References

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