AGR 33300 – 3 CREDITS
DATA SCIENCE FOR AGRICULTURE

In-Person (CRNs 27580 & 27581)

- Location: LILY G428
- Lecture: Tuesdays, 8:30–9:20 AM
- Lab: Thursdays, 8:30–11:20 AM

Online Option (CRN 40265)

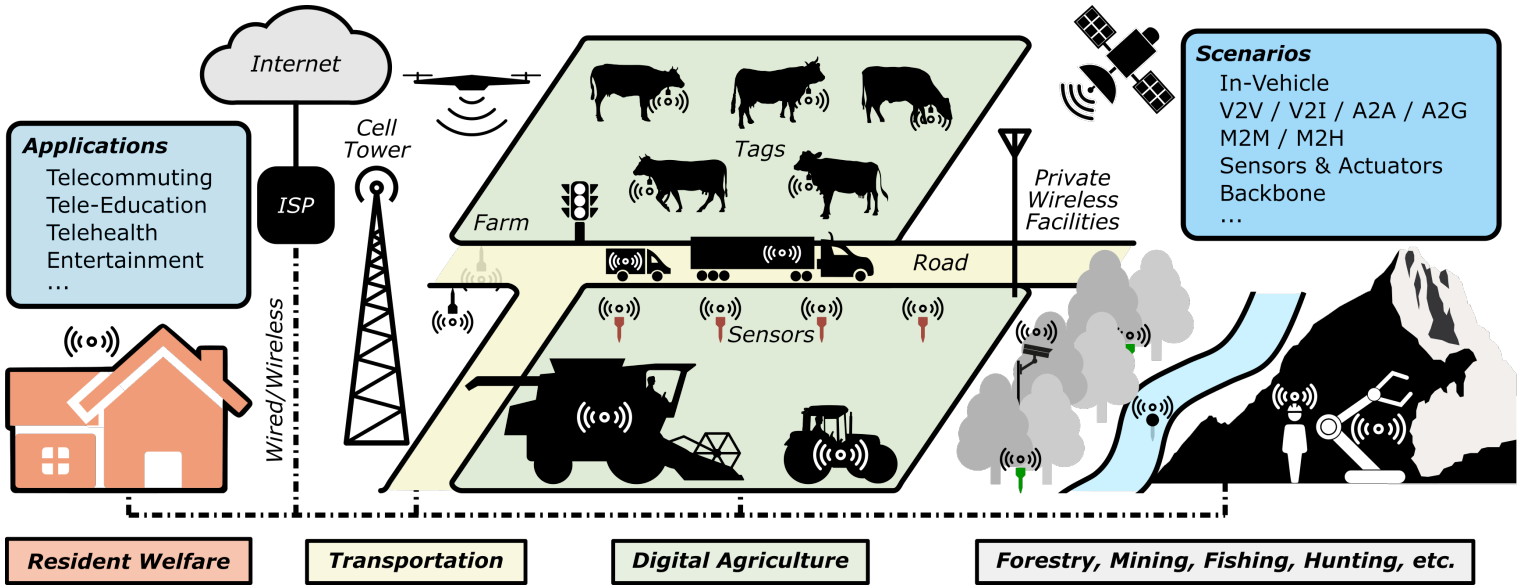
- Asynchronous

PURDUE UNIVERSITY | Purdue Online

Example Data Science Applications in Ag

Data science plays a crucial role in agriculture.

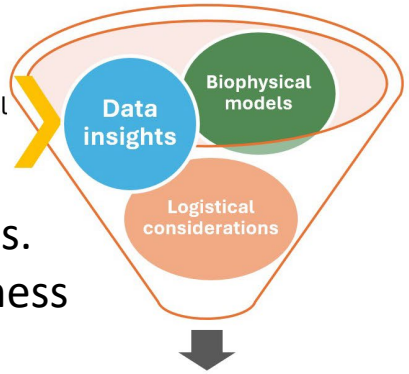
- Precision Farming
- Crop Monitoring and Prediction
- Climate Resilience
- Supply Chain Optimization
- Soil Health Assessment
- Livestock Management
- Market Insights
- Sustainable Practices



Zhang, Y., Love, D.J., Krogmeier, J.V., Anderson, C.R., Heath, R.W. and Buckmaster, D.R., 2021. **Challenges and opportunities of future rural wireless communications**. *IEEE Communications Magazine*, 59(12), pp.16-22. DOI: 10.1109/MCOM.001.2100280.

The Data Pipeline

Key Steps

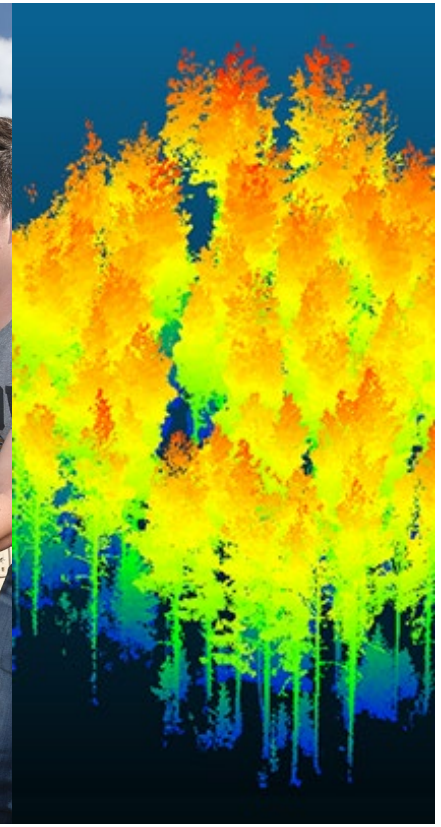


- Identify **Data Needs**: Clearly articulate the purpose and objectives of the data analysis.
- **Data Acquisition**: Gather relevant datasets from various sources, ensuring completeness and relevance.
- **Data Quality Assessment**: Evaluate the reliability, accuracy, and completeness of the acquired data. (We will learn tidy data and FAIR principles for this.)
- **Data Wrangling**: Prepare the data for analysis by addressing issues such as *format* discrepancies, *compatibility*, and *mobility*.
  - Data Filtering and Cleaning: Remove inconsistencies, errors, and outliers from the dataset to enhance data quality.
  - Data Integration: Combine multiple datasets to create a unified and comprehensive dataset for analysis.
- **Data Visualization**: Present the data in visual formats such as charts, graphs, and dashboards to facilitate understanding and interpretation.
- **Data Analysis** and Data-Driven **Decision-making**: Utilize insights gained from data analysis to inform decision-making processes and drive strategic outcomes.

Matrix of Domain Knowledge

… and Data Science Skills in Our Course

Field of Study
Food Science
Agricultural Engineering
Animal Sciences
Forestry and Natural Resources
Agronomy
Agricultural Economics



Matrix of Domain Knowledge

… and Data Science Skills in Our Course

Field of Study	Data Skill Focus	Activities
Food Science	Research question identification, data utilization	Formulating research questions, working with data to address research objectives
Agricultural Engineering	Sourcing data, data gap analysis, data quality assessment, data management	Procuring relevant data, identifying data gaps, assessing data quality, managing data effectively
Animal Sciences	Data wrangling, data cleaning	Managing data formats, filtering and cleaning datasets
Forestry and Natural Resources	Data integration, spatial analysis	Merging disparate datasets, handling spatial data
Agronomy	Data visualization, interpretation, spatial data analysis techniques	Visualizing data, selecting appropriate graphics, interpolation, cluster analysis
Agricultural Economics	Time series analysis, regression modeling	Analyzing temporal data, regression analysis

Matrix of Domain Knowledge

… and Data Science Skills in Our Course

Skill	Field of Study					
	Food Science	Agricultural Engineering	Animal Sciences	Forestry and Natural Resources	Agronomy	Agricultural Economics
Identify Data Needs	✓			✓	✓	✓
Data Acquisition		✓			✓	
Data Quality Assessment		✓	✓			
Data Wrangling	✓	✓	✓	✓	✓	✓
Data Visualization	✓	✓	✓	✓	✓	✓
Data Analysis	✓	✓	✓	✓	✓	✓

About the Instructor – Dr. Yaguang Zhang

Teaching

- Clinical Assistant Professor (since October 2023) **teaching Data Science courses** (both in-person and online)
- In Departments of Agricultural & Biological Engineering and Agricultural Sciences Education & Communication
- **Purdue Online Faculty Liaison** for the College of Agriculture

Research

- **Sun Shadow and Energy Simulation** for digital agriculture (featured in Purdue Today)
- **Telecommunication Systems** to support rural community development
- **Highway Maintenance** innovation and data-driven solutions
- **Engineering Education**

Extension

- **Workforce Development Co-Lead**, NSF Research Center for the Internet of Things for Precision Agriculture (IoT4Ag)
- Affiliated with the Purdue Open Ag Technology and Systems (OATS) Center and IDAAS
- Hosting 50+ events annually for community building and broadening ag workforce

Email: ygzhang@purdue.edu

PURDUE UNIVERSITY