# AI for Transportation: From concepts to implementation

## Recitation 1: Urban Mobility and AI

**Prof. Jinhua Zhao** | Professor of Cities and Transportation

# AI for Transportation

R1: Introduction

R2: Discrete Choice Modeling

R3: Real-World AI Case Studies

R4: Generative AI

# Goal of Recitations

- Temporally spaced repetition
- Activate your critical thinking
- Let you **imagine**

- **Enable your learning**

Essay Prompts

Reflections/Quizzes

Coding Notebooks

# Who is your TA?

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# AI for Transportation

- R1: Introduction
- S1: Success and Future
- S2: Transportation: System, Changes and Data
- S3: Grounded AI: Structure, Trend, Why Now?
- S4: AI: Tensions and Opportunities

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Beijing 1982 | Source: Wang Wenlan, Wen's Lens, https://tinyurl.com/34kparne

# What is the metric?

# Define success & the future

for your:

**field / industry / community**

in the light of:

**data, AI, and behavior**

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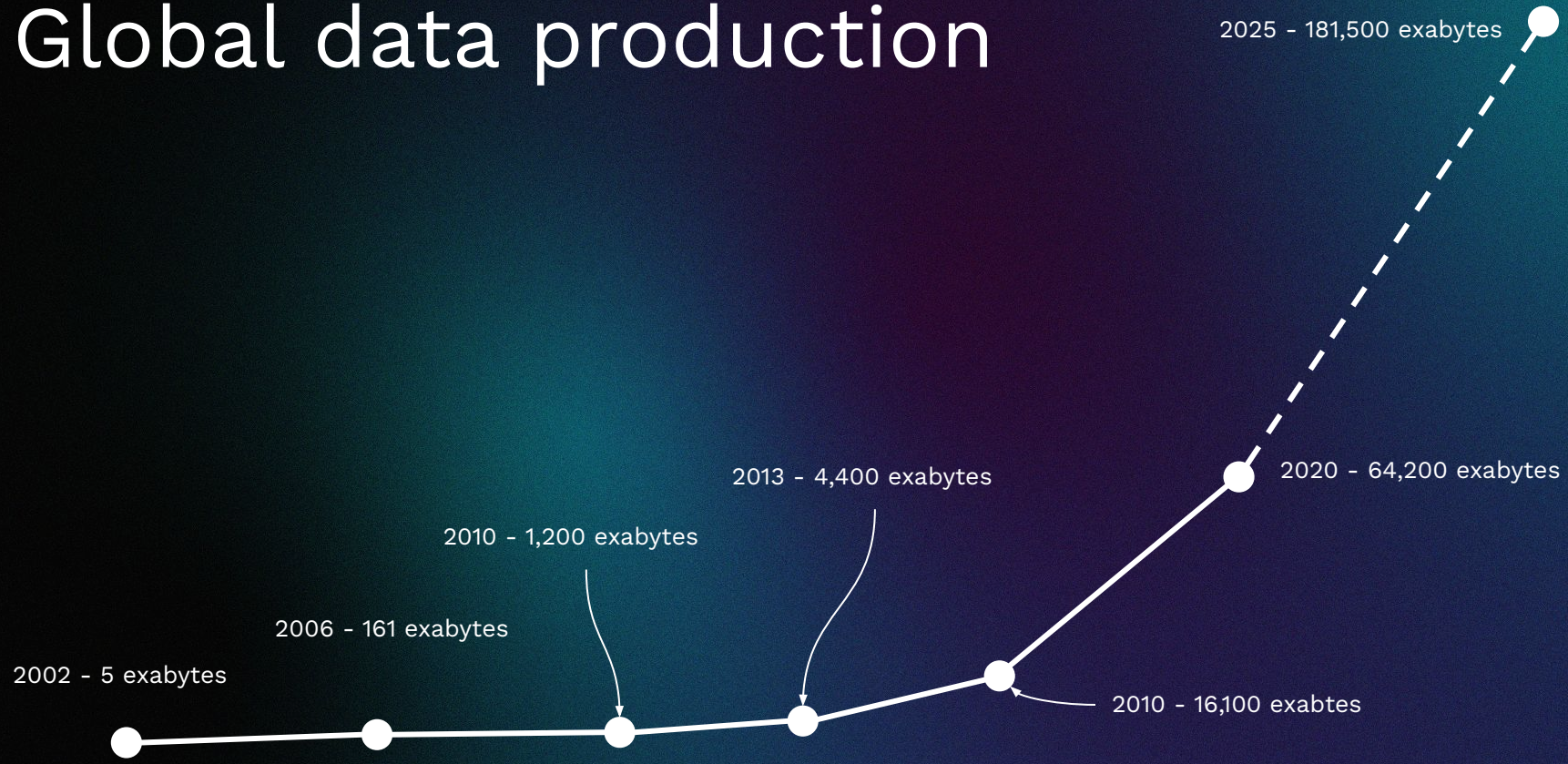
# Global data production



## Behavioral Thinking

- Emotional
- Social
- Perceptional

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## Transportation Technology

- Electrification
- Automation
- Connectivity
- Sharing

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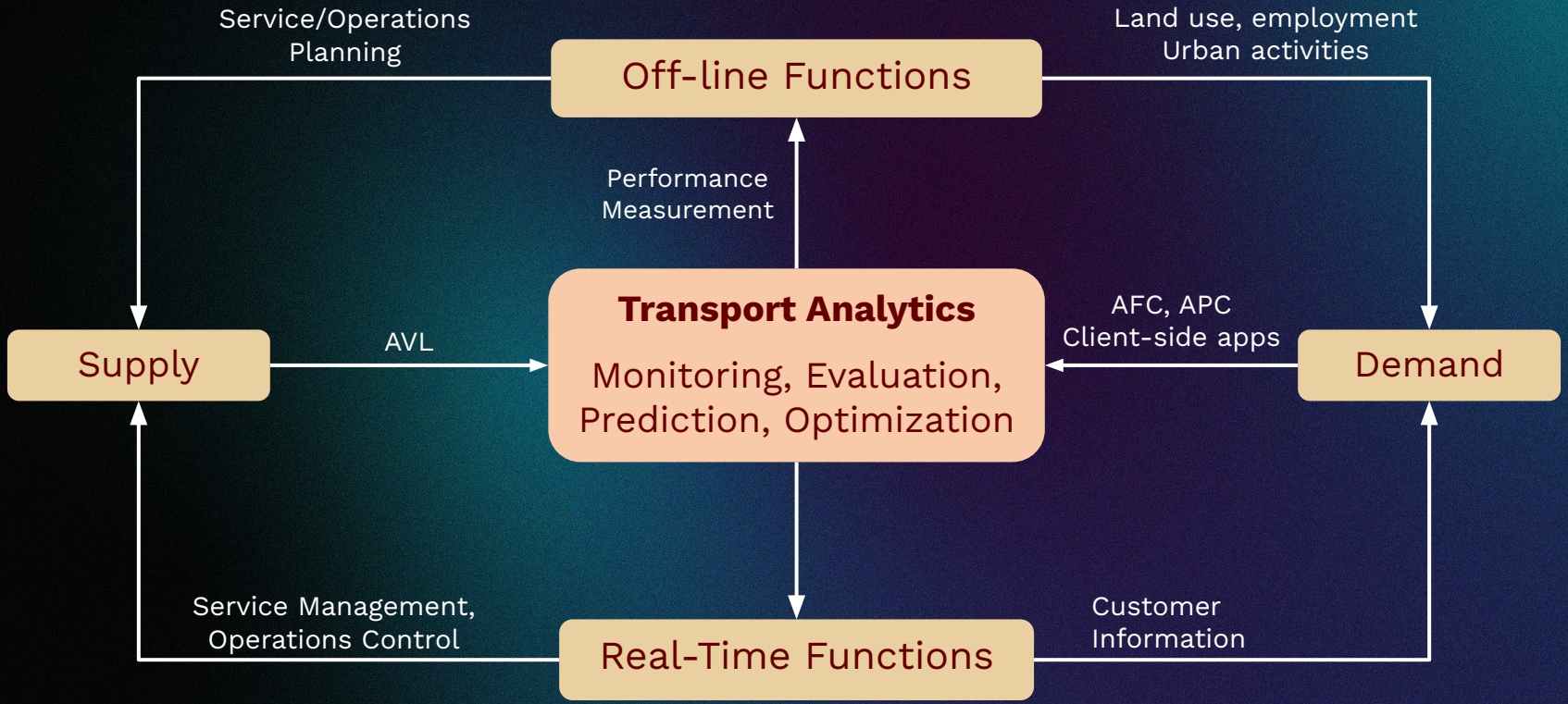
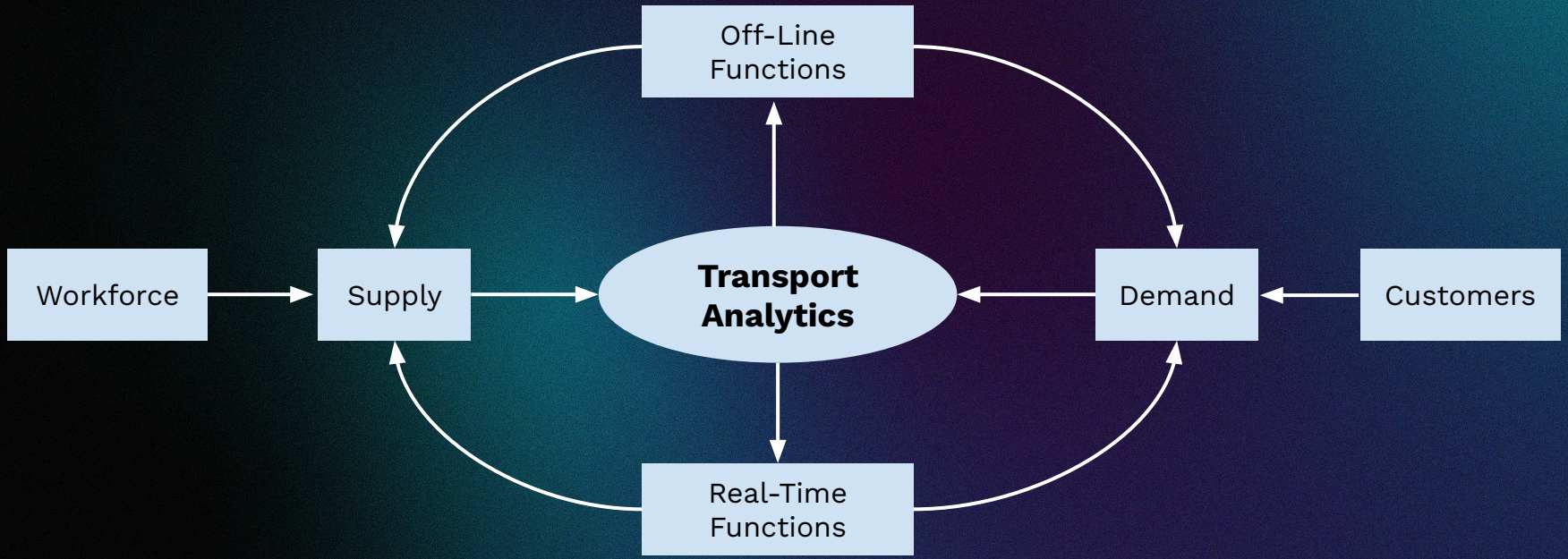
## Computational Foundation

- Representation
- Explanation
- Prediction
- Control
- Creation

# Transportation analytic functions



# Can AI help?


Off-Line Functions
Workforce
Supply
Transport Analytics
Demand
Customers
Real-Time Functions

**Create a similar diagram**
for your
field / industry / community

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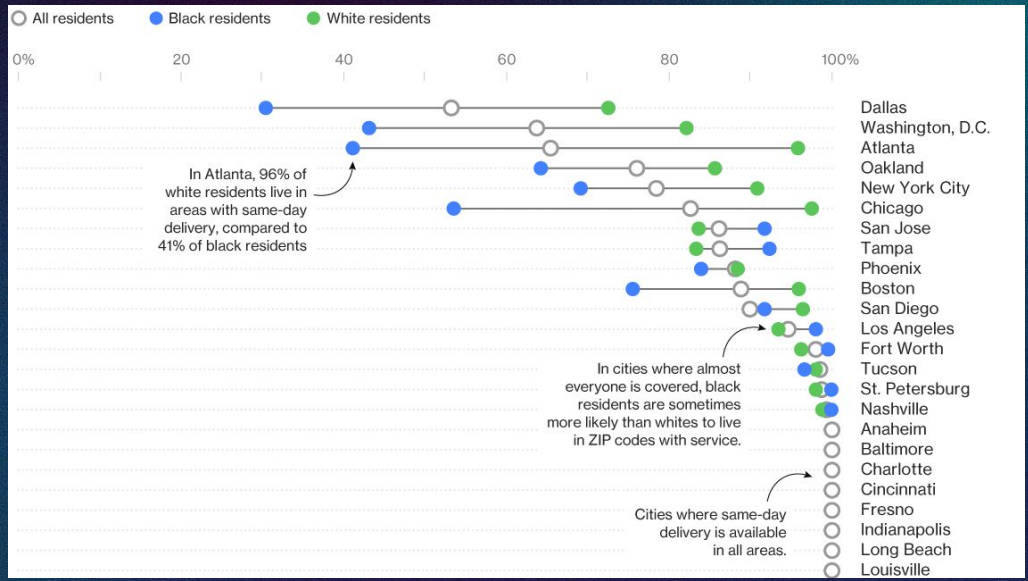
# What is grounded AI applications?

- **Problem-Driven**, Not Technology-Driven
  - Built-in response to real-world needs
- **Context-Aware**
  - Embedded in institutional, human, and social contexts
- **Human-in-the-Loop**
  - Humans retain agency, oversight, and interpretability
- **Deployable**
  - Deployment-readiness
- **Iteratively Co-Developed**
  - With industry partners, stakeholders, and users

# Example: Amazon same-day delivery

- Amazon SDD systematically disadvantaged non-white residents
- Cited low Prime membership and distance to warehouses
- Amazon faces lawsuit in DC (2024)

- Operational decisions → likely by optimization model

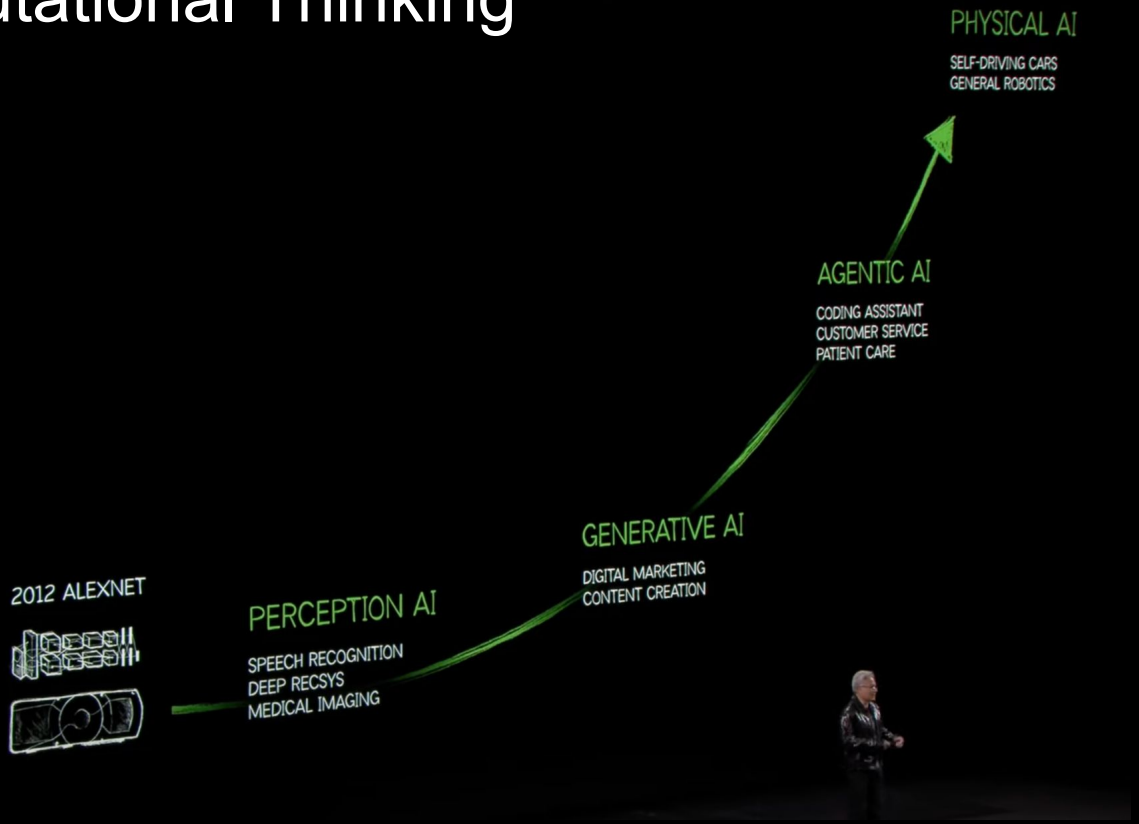



"Amazon Offers Same-Day Delivery, but Not for Everyone." Bloomberg Graphics, Bloomberg, 2016, https://www.bloomberg.com/graphics/2016-amazon-same-day/ .

# Why now?

- As AI increases its reach, we need to:
  - Understand the data it was trained on
  - Quantify the impacts
  - Safeguard its action area

# P2: Computational Thinking



For your
field / industry / community
**describe an** existing (or come up with a novel) **AI model that could provide useful insights**

Can you explain the model?

Who benefits when the model “works”?
Who loses when it fails?

Who is in control?

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- R1: Introduction
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- S2: Transportation
- S3: Grounded AI
- S4: Communication

# Tensions

- Generic model **vs** Domain specific
- Explain **vs** Predict
- Causality **vs** Correlation
- Simple → Complex **vs** Complex → Simple
- Understand **vs** Control
- Discover **vs** Create

# Reliefs

- Clear definition of metrics
- Control over model
  - Input/Output
  - Parameters
  - Acceptance/Rejection
- Interpretability

Representation

Prediction

Explanation

Control

Creation

Communication

What is success?