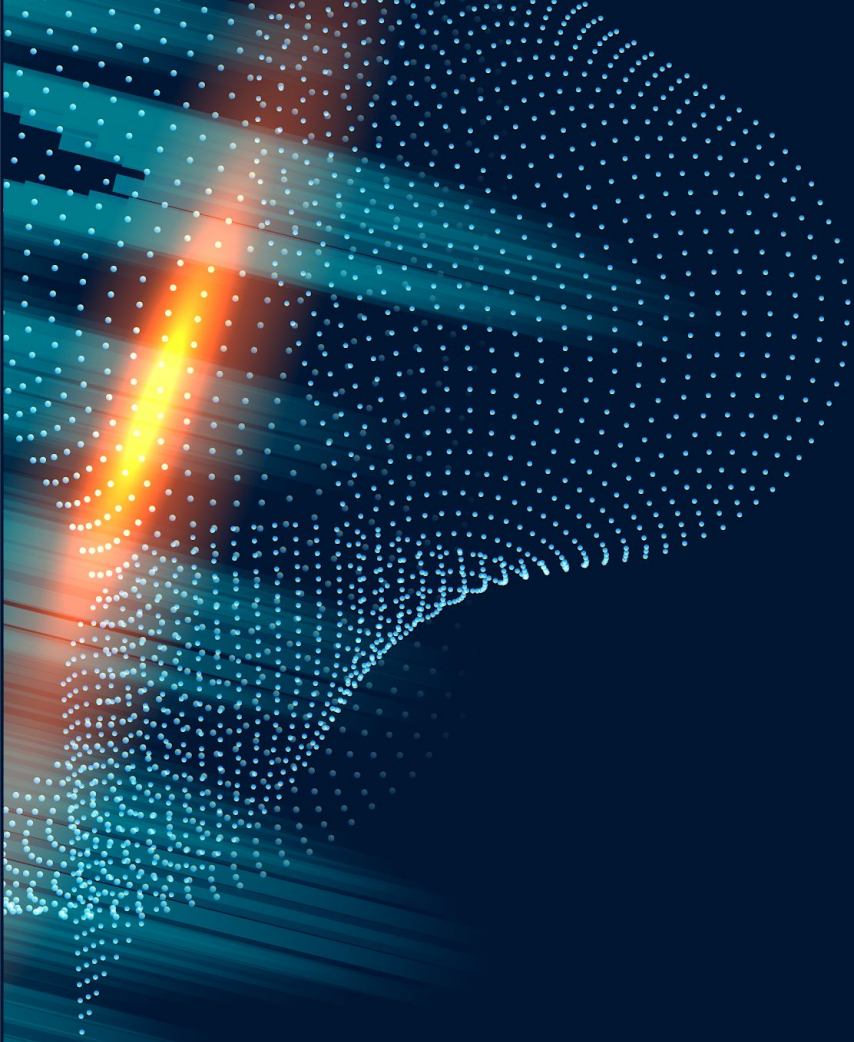




DeliverAI

(Deliver-eye)

Curtis Knaack and Tyler Moore



DeliverAI

What is it?

What does DeliverAI try to do?

- Optimize food delivery
 - Ways to give new orders to drivers such that their path makes the most sense
 - Similar to ride sharing
 - Tries to enhance DoorDash and other similar platforms
 - Truck delivery as well



What problem does this solve and how successful is it

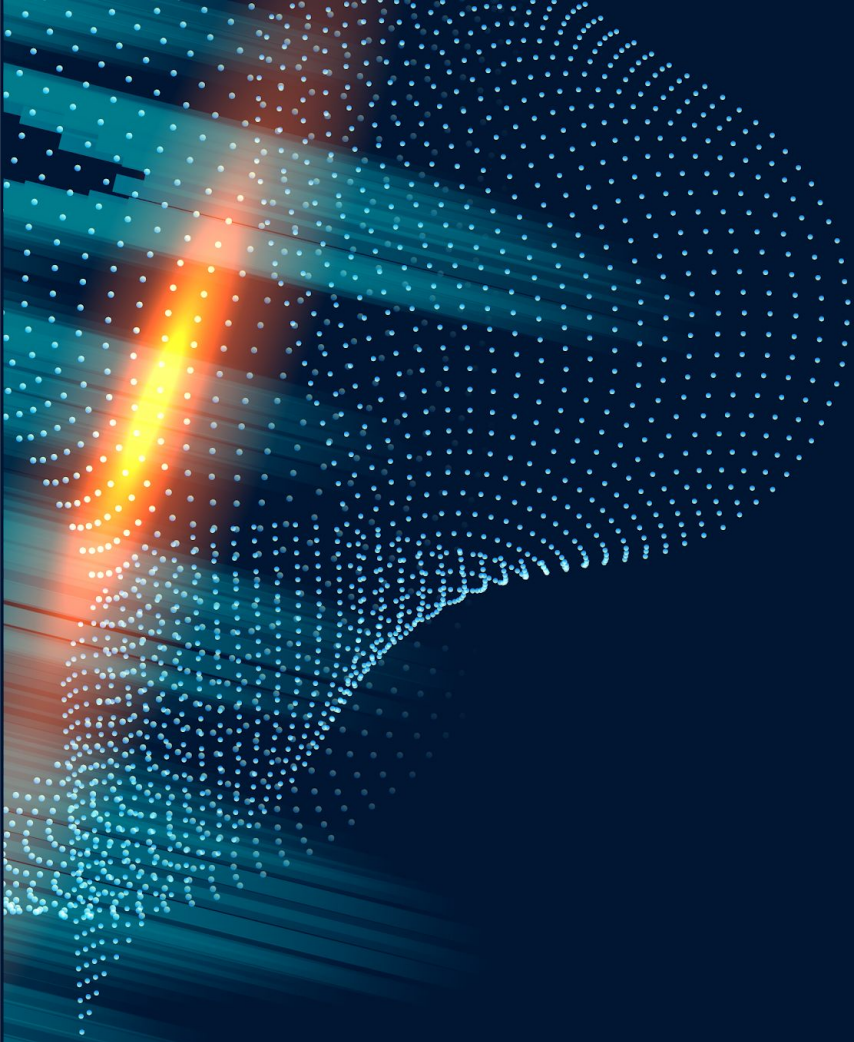
- Delivery efficiency
 - Helps with climate
 - Improves customer satisfaction
 - Driver utilization
- Quite successful overall
 - Reduces fleet size by 12%
 - Reduces distance by 13%
 - Improves utilization by 50%



Where does this fit into the AI scene

- Competitor with bot delivery systems
- Enhances current systems instead of redesigning the solution
- Can be acquired and implemented into many existing systems
 - Potentially other delivery methods later on
- First-ever path-sharing network





DeliverAI

Main Contributions

Goals of the system

- Minimize distance traveled
 - Save fuel
 - Minimize environmental impact
- Minimize vehicles used
 - Concurrent deliveries
- Minimize delivery completion time
 - Still an increase



New strategies utilized by DeliverAI

- Deliver to a central location
- “Delivery hop”
 - Synchronization issues
- Path-share
 - Utilize the same vehicle for some of the trip

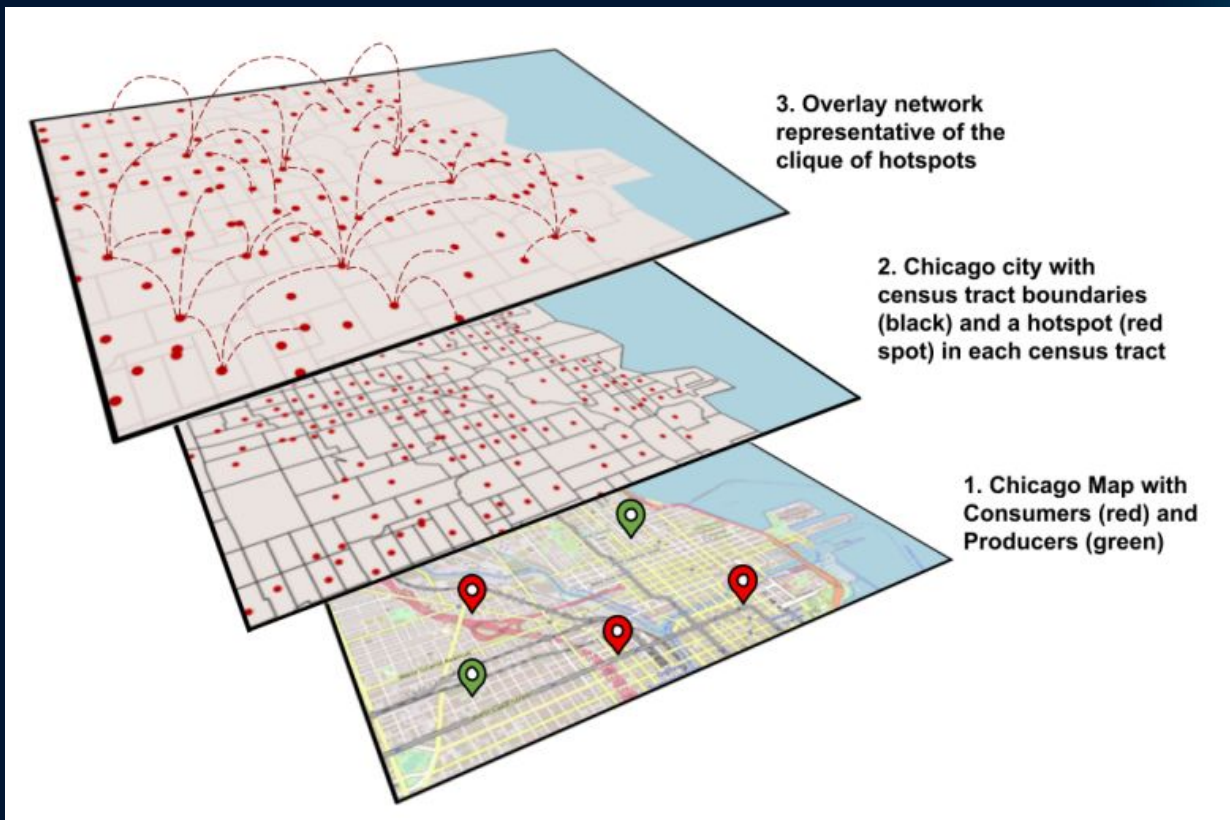


How is this achieved?

- Determines producers/consumers
- Uses hotspots
 - Where deliveries change vehicles
- Agents trained specifically for specific hotspots



Overlay Network



Q-Learning!

Algorithm 1 Q-Learning Algorithm for Training Agents

- 1: **Require:** learning rate $\alpha \in (0, 1]$, discount rate $\gamma \in (0, 1]$
- 2: **for** each $h_i \in H$ **do**
- 3: Initialize $agent_i$ for h_i
- 4: Initialize $Q_i(s, a)$ arbitrarily, for all $s \in S, a \in A$
- 5: Initialize policy π (π_{ϵ} / $\pi_{\text{boltzmann}}$) with respect to Q_i
- 6: **for** each episode **do**
- 7: Randomly initialise initial state $s_0 \neq h_i$
- 8: Select action a_0 according to policy π
- 9: **for** $t = 1, 2, \dots$ **do**
- 10: Choose a_t from s_t using π
- 11: Execute action: $s_{t+1} \leftarrow a_t$
- 12: $Q_i(s_t, a_t) \leftarrow Q_i(s_t, a_t) + \alpha[r_i(a_t|s_t) +$
- 13: $\gamma \max_a Q_i(s_{t+1}, a) - Q_i(s_t, a_t)]$
- 14: **if** $s_{t+1} = h_i$ **then**
- 15: end episode

Conclusion

DeliverAI is very promising, but needs to be expanded beyond just one city before we see the food delivery business transformed.



Questions?

