Leveraging Cloud Computing to Make Autonomous Vehicles Safer

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AVs need:

High-fidelity data:
Better information for decision-making

State-of-the-art computation:
Want to run the most accurate models.

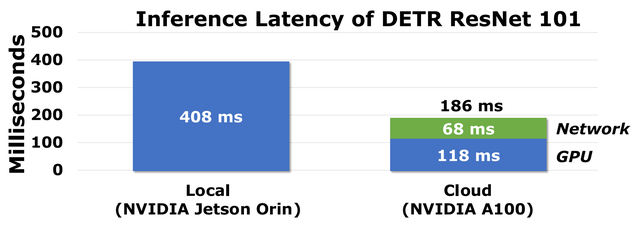
Timely results:
Run in real-time to beat human reaction times.

Hardware

Limited in AVs due to physical constraints:
power, cooling, stability.

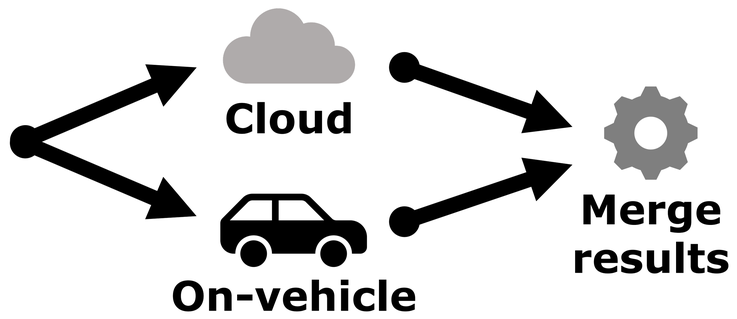
Plentiful in the cloud:
Specialized datacenters, frequent H/W upgrades.

Powerful cloud H/W:
can run highly accurate models in real time.



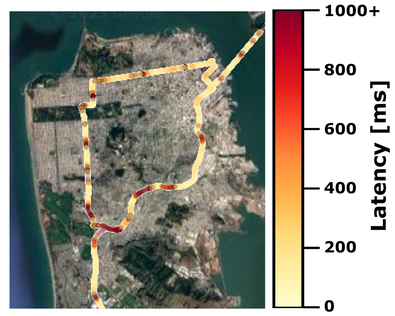
AVs should use the cloud!

- **Large pool of powerful resources**
- **5G networks are good enough**
- **Use <u>speculative execution</u> to ensure reliability**



Network

Modeled transmission of HD camera footage over 5G from car to cloud.

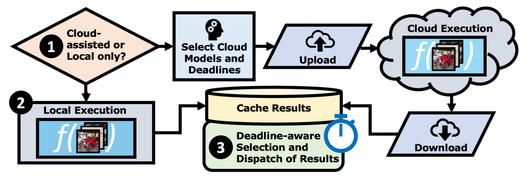


Round-trip latency:

- **Fast**
  Median: 68 ms
- **Unreliable**
  99th percentile: 3027 ms

Design

1. Speculatively execute in cloud.
2. In parallel, run locally.
3. Fall back to local results when the cloud is unavailable.



Read the paper

tinyurl.com/cloud-avs

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