Neural Network Verification With Vehicle: Chapter 5 - Application Areas and Conclusions

ICFP'23 Tutorial

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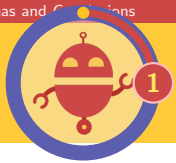
Vehicle



- A tool for the whole life-cycle of a neural network verification property:
  - Training
  - Verification
  - Integration
- A pure functional specification language provides the glue.
- Improving trust in AI systems using the power of functional programming!

Possible applications

Robustness of:

- Intrusion detection systems
- Malware detection systems
- Chatbot systems
- Sensor fusion pipelines

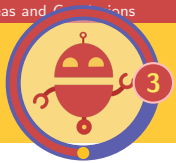
Sanity of physics simulations:

- Monotonicity
- Conservation laws

Correctness of control systems:

- Autonomous vehicles
- Network traffic balancing

Conclusions



Functional programming takeaways:

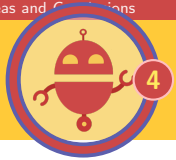
- Expressive type systems (generalisation, instance resolution) are especially useful for multi-backend systems.
- Possibly more useful in the backends than user code!

PL/verification research challenges:

- Are type systems for abstract interpretation-based verifiers possible?
- A moderately performant formally verified verifier would be amazing!

We're always interested in collaborations so please reach out!

Finally...



Thank you for coming!

Q & A time!