

# Solving General Twisty Puzzles with RL

**Goal:** Compute interpretable solutions on consumer hardware

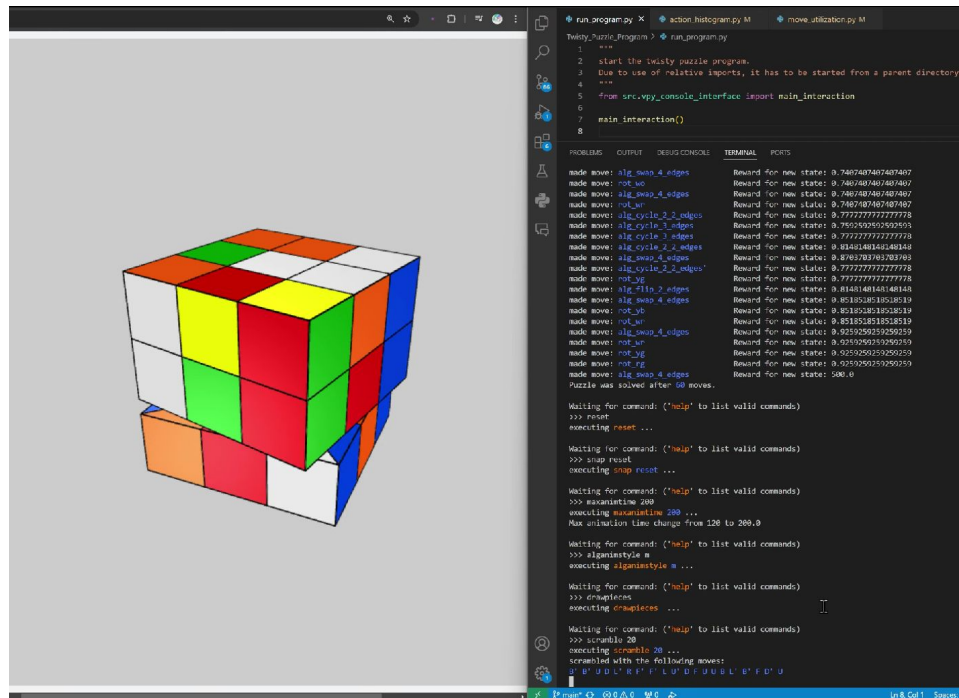
## Methods:

- Automatic action space augmentation
- Dense, intuitive rewards

## Result:

- 100x faster training than previous RL-approaches
- AI solutions similar to human ones

**Time:** ~600 hours over 4 years



[Code on GitHub](#)

*master's thesis*

*video explanation*

*more demo videos*

# Simulating real-world traffic sensor noise for more robust RL-Traffic Signal Control

**Goal:** Improve robustness of RL-TSC agents against noisy data

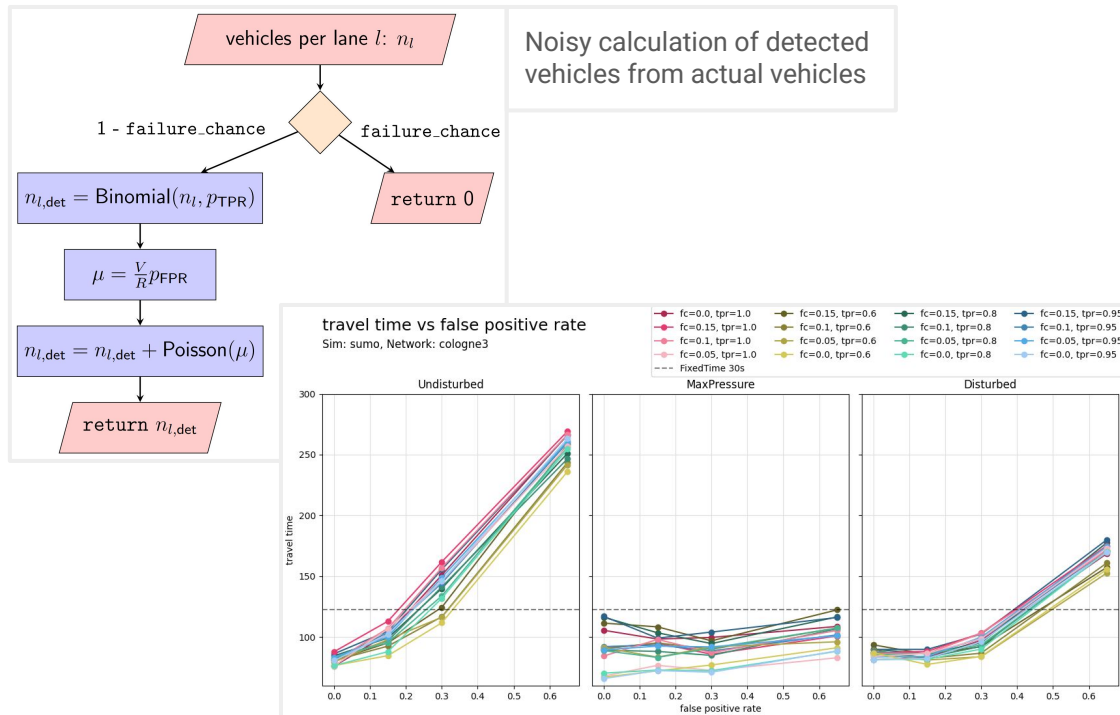
## Methods:

- Simulate realistic sensor noise
- >600,000 simulated hours to test parameter settings and analyze their impact

## Result:

- Understanding impact of different noise types on tested RL and non-RL agents
- Actionable sensor type deployment recommendations

**Time:** 2-3 months



[Code on GitHub](#)

publication planned

# Custom Ticket to Ride Map Creation Tools

**Goal:** Efficiently create custom Ticket to Ride versions

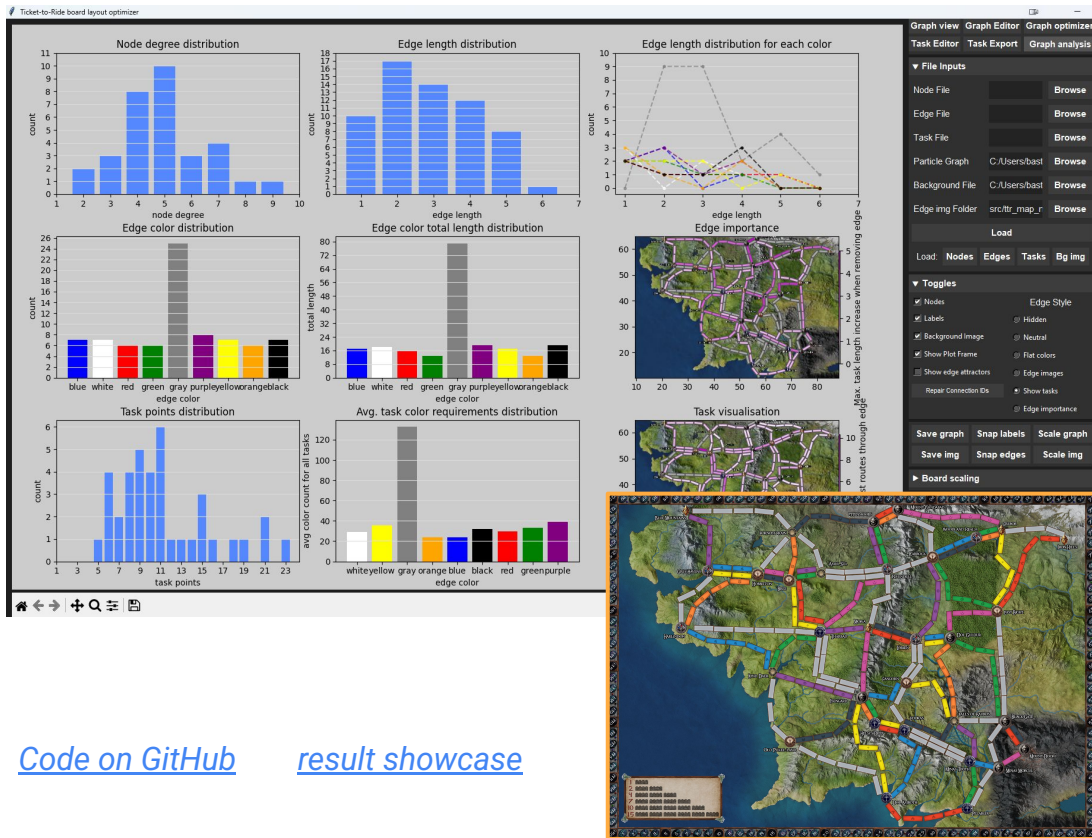
## Methods:

- Analyzed creation bottlenecks and processes
- Built tools to support creation at multiple stages

## Result:

- Faster creation of variants
- High-quality custom games

**Time:** ~300 hours over 1 year



[Code on GitHub](#)

[result showcase](#)

# Northgard Board Game with Web-UI

## Goal:

- Recreate the board game Northgard digitally
- Write web-UI without prior JS/CSS/html knowledge

## Methods:

- AI tools for writing frontend
- Python backend
- Custom tools for asset creation

## Result:

- Prototype with responsive web-UI

**Time:** ~100 hours incl. asset creation



[Code on GitHub](#)

[demo video](#)

[game info](#)

[Assets on GitHub](#)

# Simplified Saboteur Game with RL players

## Goal:

- Investigate emergence of deceptive AI behaviour

## Methods:

- LLM-accelerated coding

## Result:

- RL-agents successfully play simplified game
- *unfinished*

**Time:** ~20 hours



[Code on GitHub](#)

[YouTube  
demo](#)

# Learning Methods in Humans, Animals and AI

**Goal:** Compare learning techniques in different organisms to inspire future research

**Methods:**

- Offered Workshop at [VANconference25](#)
- Years of following current research

**Result:**

- Overview helps predict industry & research direction

**Time:** <10 hours

Learning method	Animals	Humans	Computer (Machine Learning)
Evolution	genetic evolution	genetic evolution	genetic algorithms (e.g. NEAT)
Trial & Error	Conditioning	Conditioning	Reinforcement learning
Imitation	Orcas teaching hunting methods & language	Learning language	Supervised learning, Imitation learning
Abstract Instructions	Bee dance to describe location of food	Most of school / higher education, baking recipes	In-context learning in LLMs
Mental Simulation	Birds cracking nuts using cars, tool use	Dreams, pondering other's reactions	World models (e.g. DreamerV3)

[GitHub page](#)

# Wizard Game with multiple AI players

**Goal:** Compare different AI techniques for creating wizard game agents

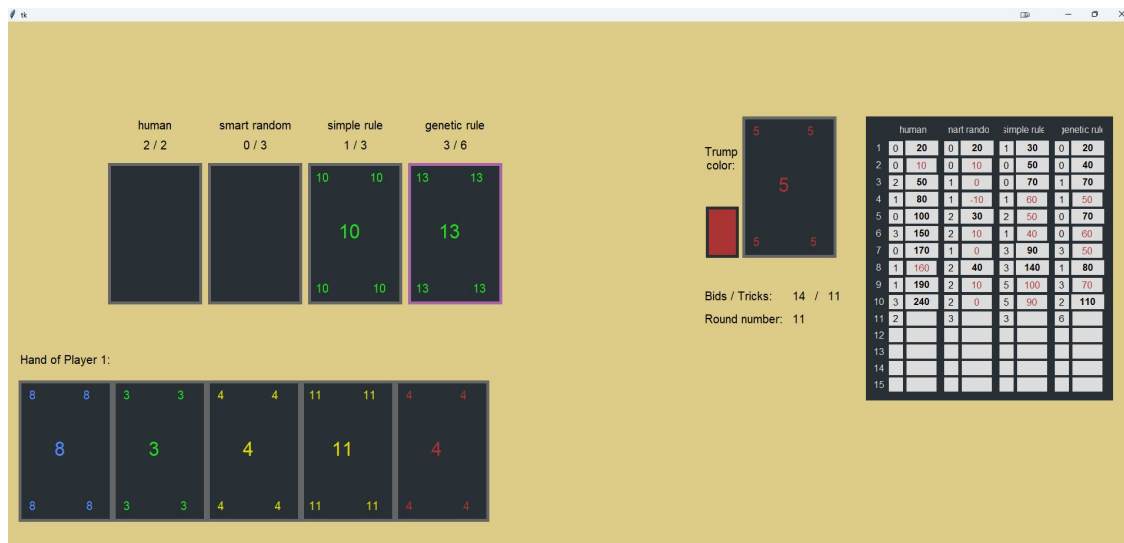
**Methods:**

- Rule-based AI, optimized via genetic evolution
- tkinter GUI design

**Result:**

- Major capability differences

**Time:** ~60 hours



[Code on GitHub](#)