interactive-atari-rl

Baseline Presentation

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Review

Goal

- Visualize RL model learning with the help of saliency maps

Data (from training)

- RL model weights
- Environment states
- Performance (reward, loss)
- Saliency

Review

Tasks of interest

- Compare RL model across different points in training
- Visualize state changes in a meaningful way

Additional

- Enable live training on webapp
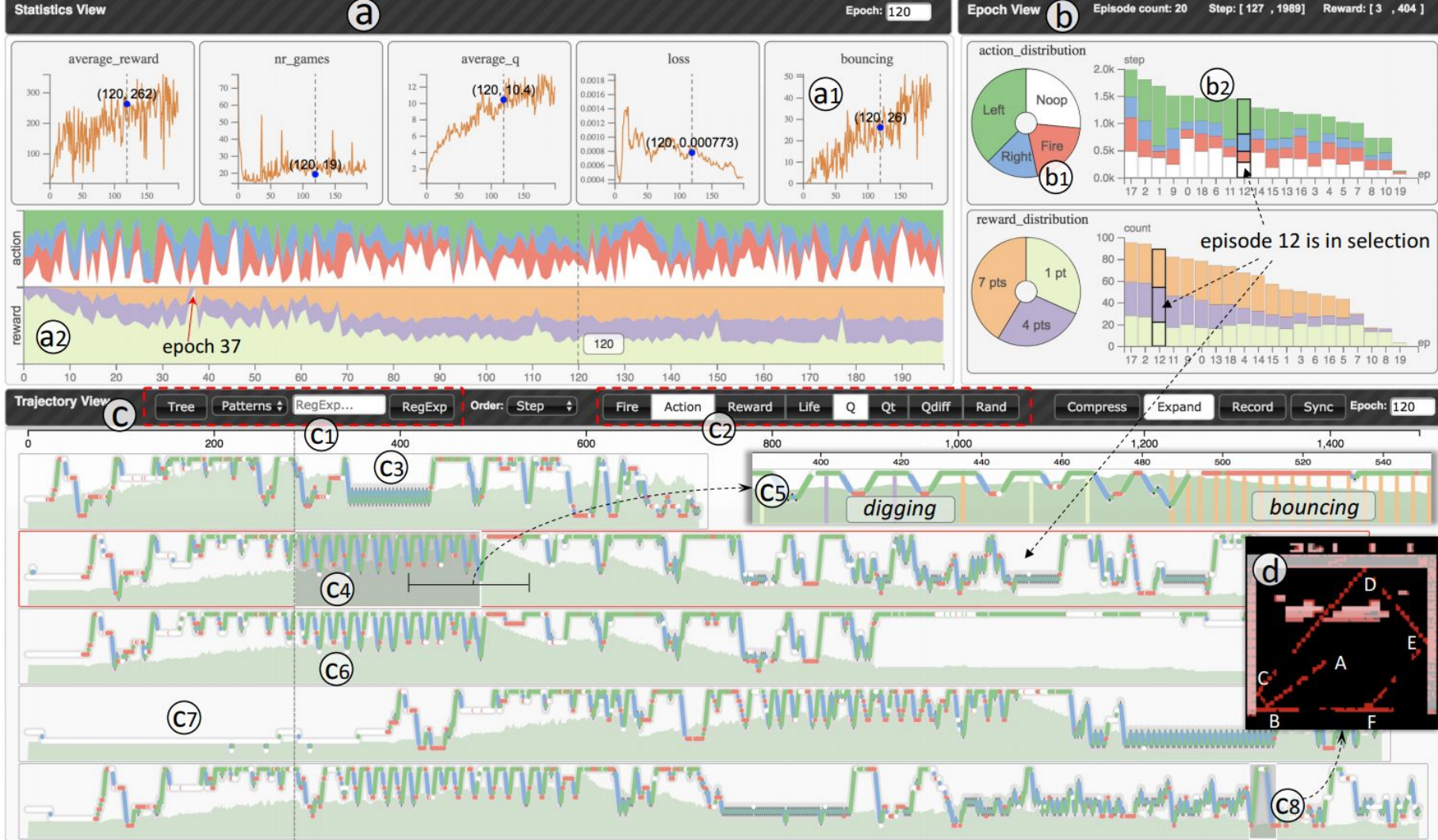- Add support for different models and comparison

Visual Analytics Literature

1. "*DQNViz*: A Visual Analytics Approach to Understand Deep Q-Networks" (Wang 2018)
2. "GAN Lab: Understanding Complex Deep Generative Models using Interactive Visual Experimentation" (Kahng 2019)

"*DQNViz*: A Visual Analytics Approach to Understand Deep Q-Networks" (Wang 2018)

- Visual analytics system to understand DQN models in 4 levels
- Problems:
  - Difficult to uncover important patterns within immense dataset
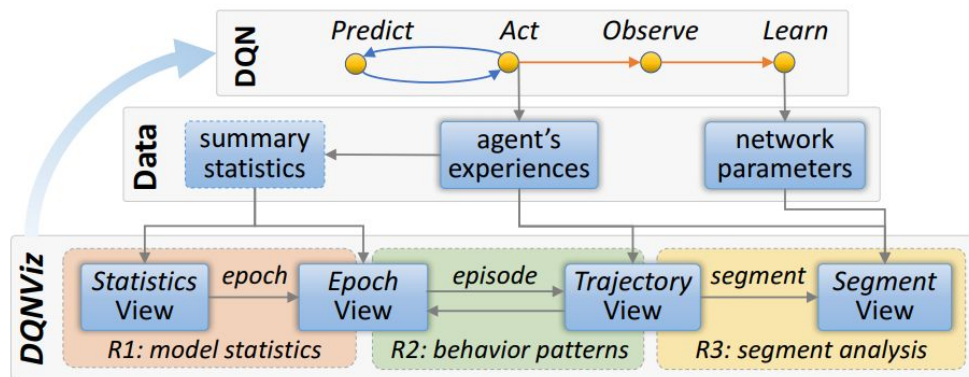 - DQN visualization limited to t-SNE plots; Not interactive

Statistics View

Epoch: 120

average_reward · (120, 262)

nr_games · (120, 19)

average_q · (120, 10.4)

loss · (120, 0.000773)

bouncing · (120, 26)

a1

a2 · action · reward · epoch 37 · 120

Epoch View · Episode count: 20 · Step: [127 , 1989] · Reward: [3 , 404]

action_distribution · step · b2

Left · Noop · Right · Fire · b1

episode 12 is in selection

reward_distribution · count

7 pts · 1 pt · 4 pts

Trajectory View

c · Tree · Patterns · RegExp... · RegExp · Order: Step · Fire · Action · Reward · Life · Q · Qt · Qdiff · Rand · Compress · Expand · Record · Sync · Epoch: 120

C1 · C2

C3

C5 · *digging* · *bouncing*

C4

C6

C7

d · D · E · A · C · B · F

C8

DQNViz

Approaches

- 4 levels of views
- Design requirements (ex. R1)
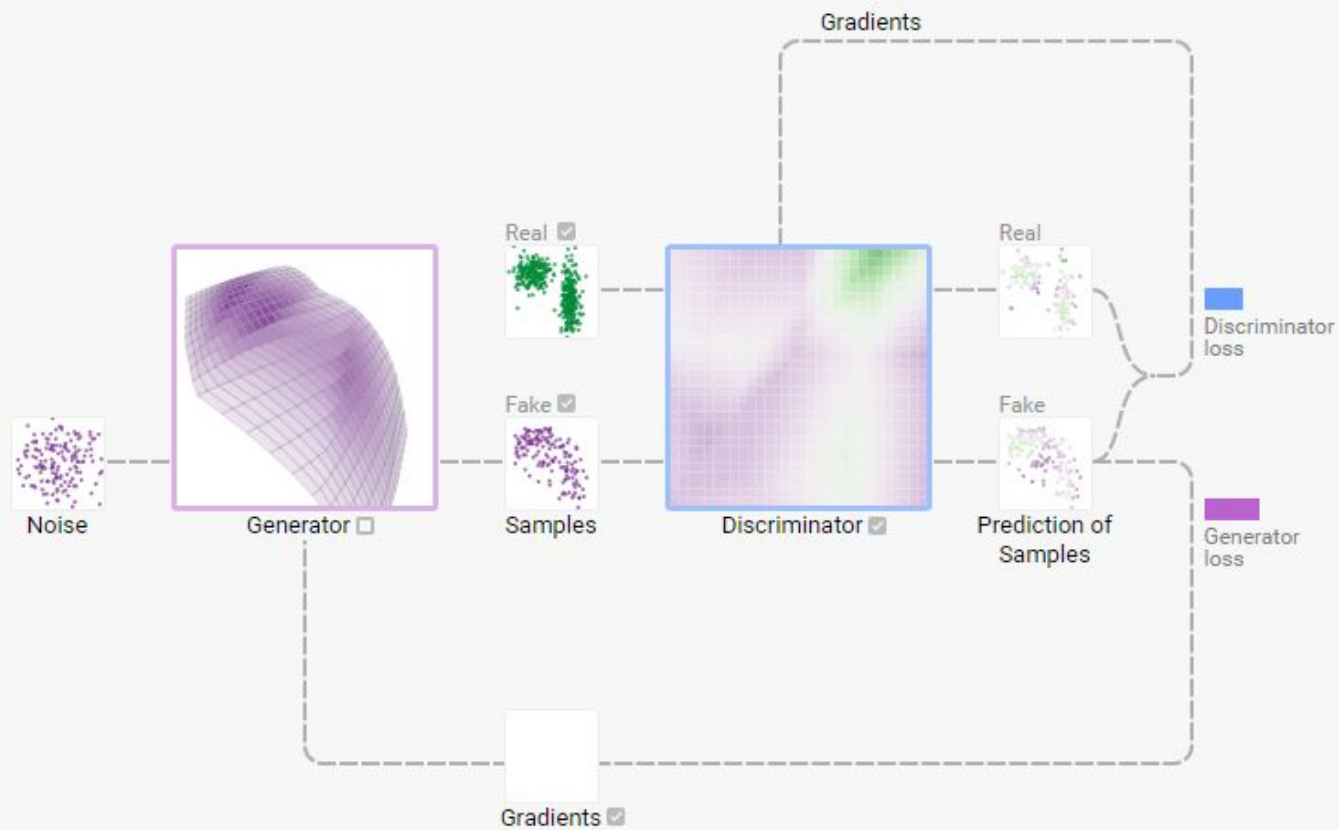
Segment view
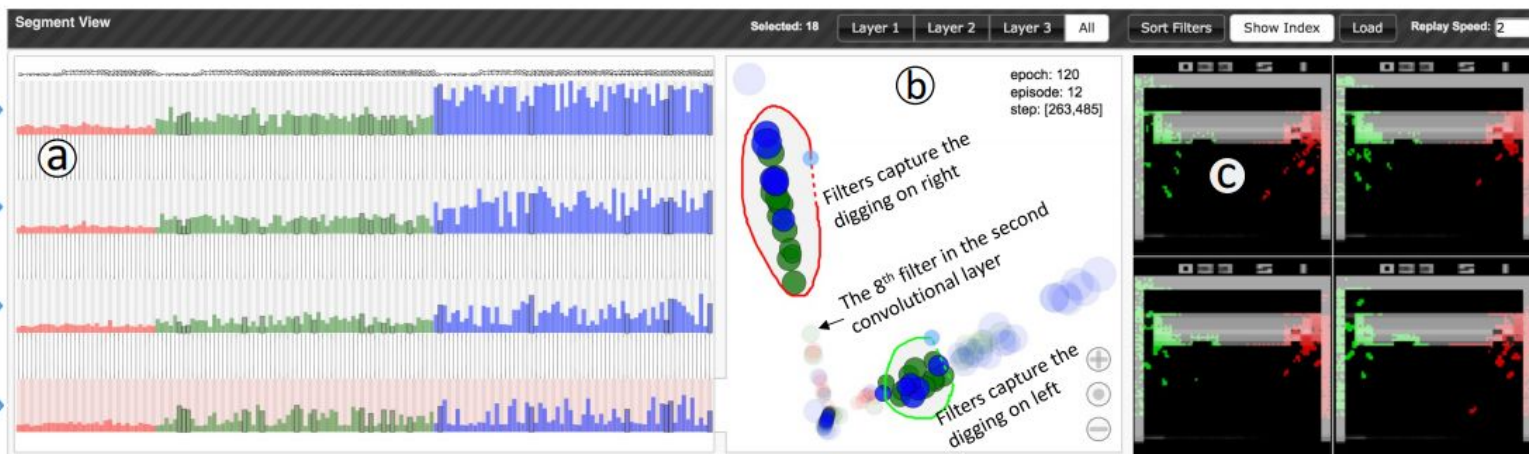
GAN Lab: Understanding Complex Deep Generative Models using Interactive Visual Experimentation" (Kahng 2019)

- First interactive visualization tool of GANs for non-experts
- Problems:
  - Interplay between generator and discriminator is complex
  - Deep models are hard to understand in general

MODEL OVERVIEW GRAPH ✏️

Gradients

Noise

Generator ☐

Real ☑

Samples

Fake ☑

Discriminator ☑

Real

Fake

Prediction of Samples

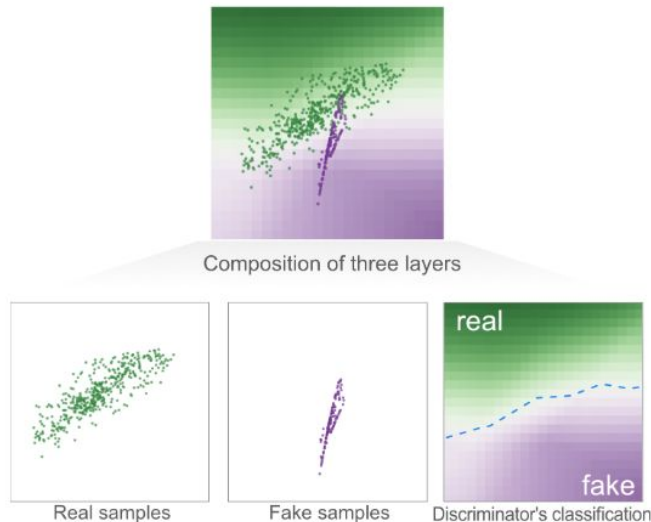Gradients ☑

Discriminator loss

Generator loss
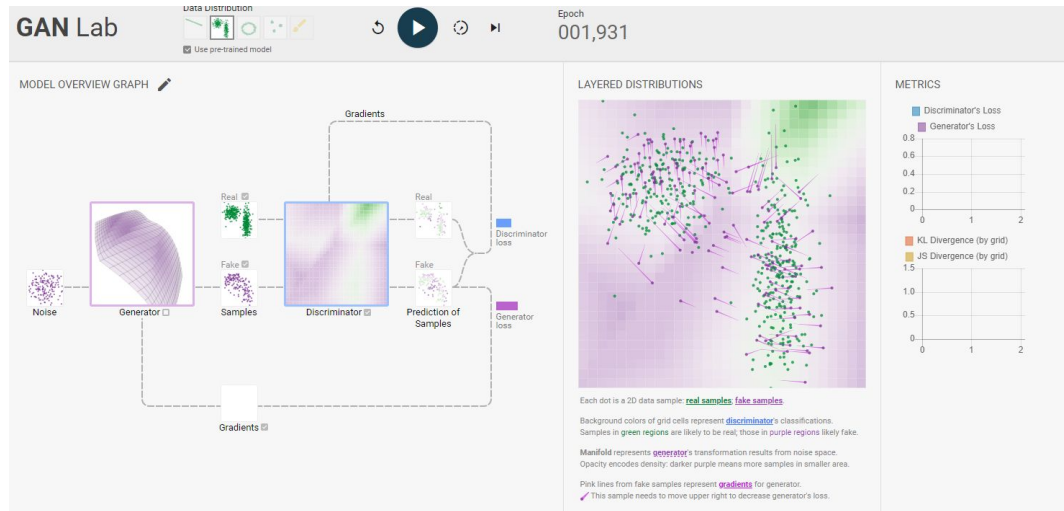
GANLab

Approaches

- Selective visual overview of model
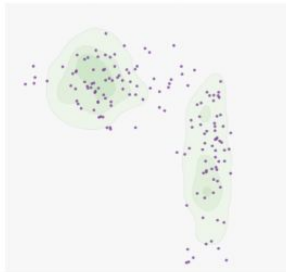- Layered distributions view
- Step-by-step training interaction

Additional

- Web-based implementation for public accessibility

Layered Distributions

Baseline

- Saliency maps of Atari agents
  - *Visualizing and Understanding Atari Agents* (ICML 2018)
  - "Heat maps" of agent attention
- Interactive views of basic data & saliency maps

Demo: http://34.73.24.75:8050/