NeuraViz: A Web Application For Visualizing Artificial Neural Network Structures

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NeuraViz

What is NeuraViz?

- What is NeuraViz?

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- Why NeuraViz?

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Goals

- Breadth of supported models

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- Breadth of supported models
- Ease of use

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Goals

- Breadth of supported models
- Ease of use
- Portability

Artificial Neural Networks

What is an artificial neural network?

Artificial Neural Networks

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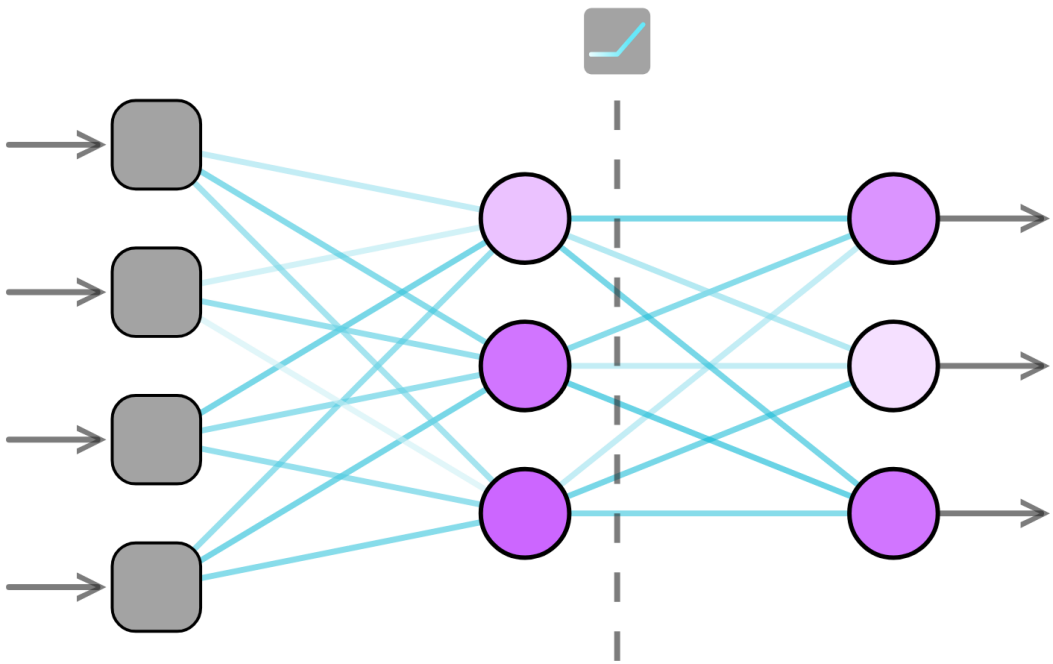


Life Cycle Model

Models

- Waterfall

Life Cycle Model

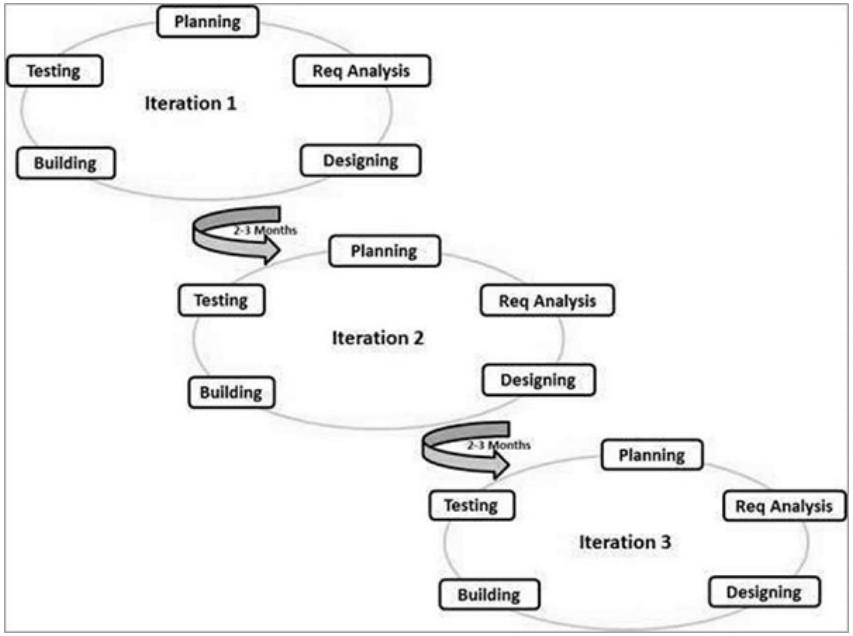
Models

- Waterfall
- Iterative

Life Cycle Model

Models

- Waterfall
- Iterative
- Agile (Scrum)



Scrum Tweaks

- **Sprint Length:**

Scrum Tweaks

- **Sprint Length:** 1 week

Scrum Tweaks

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- **Standups:**

Scrum Tweaks

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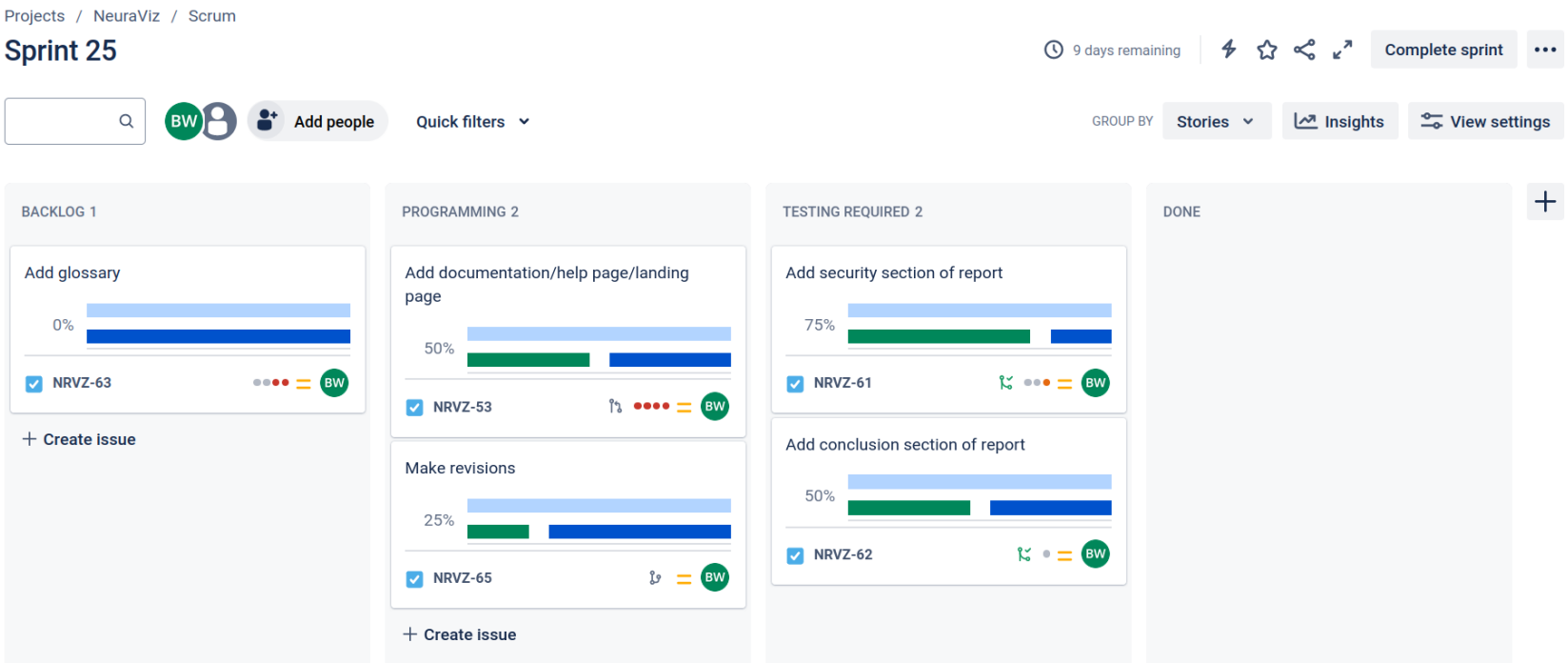
Scrum Tweaks

- **Sprint Length:** 1 week
- **Standups:** weekly
- **Retrospectives:**

Scrum Tweaks

- **Sprint Length:** 1 week
- **Standups:** weekly
- **Retrospectives:** integrated into standups

Process Technologies



Requirements

Functional Requirements

- As a user, I can see the full graph of a valid uploaded model once it finishes processing.
- As a user, I can pan and zoom the model visualization.
- As a user, I can export the graph to LaTeX TikZ syntax.
- Etc.

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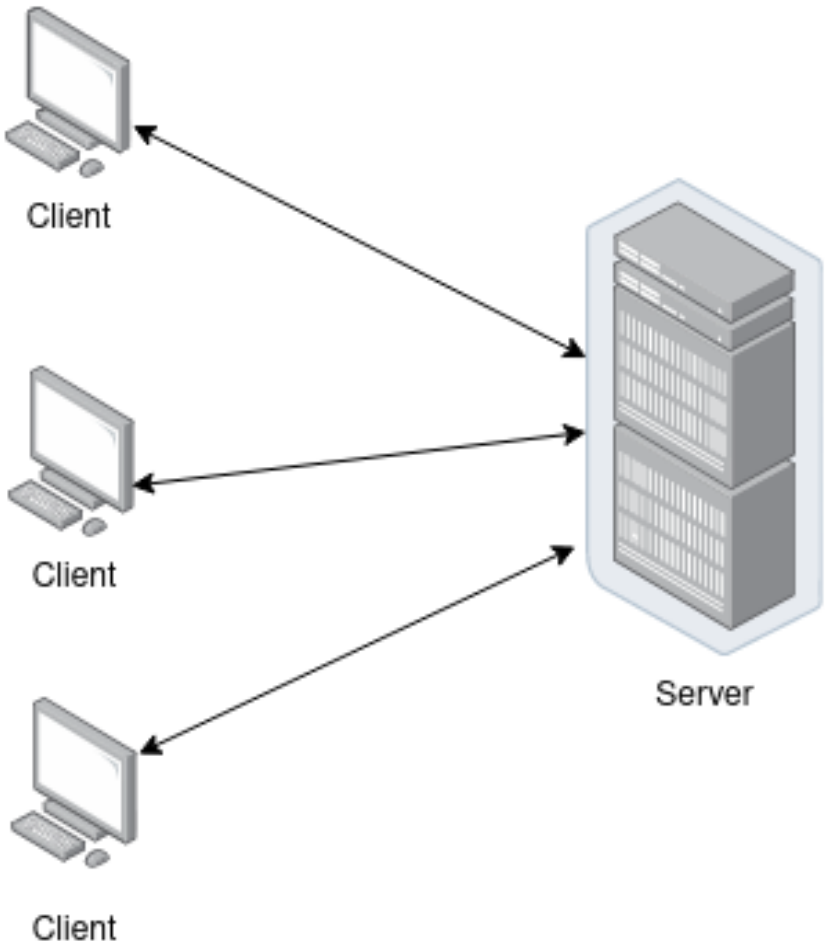
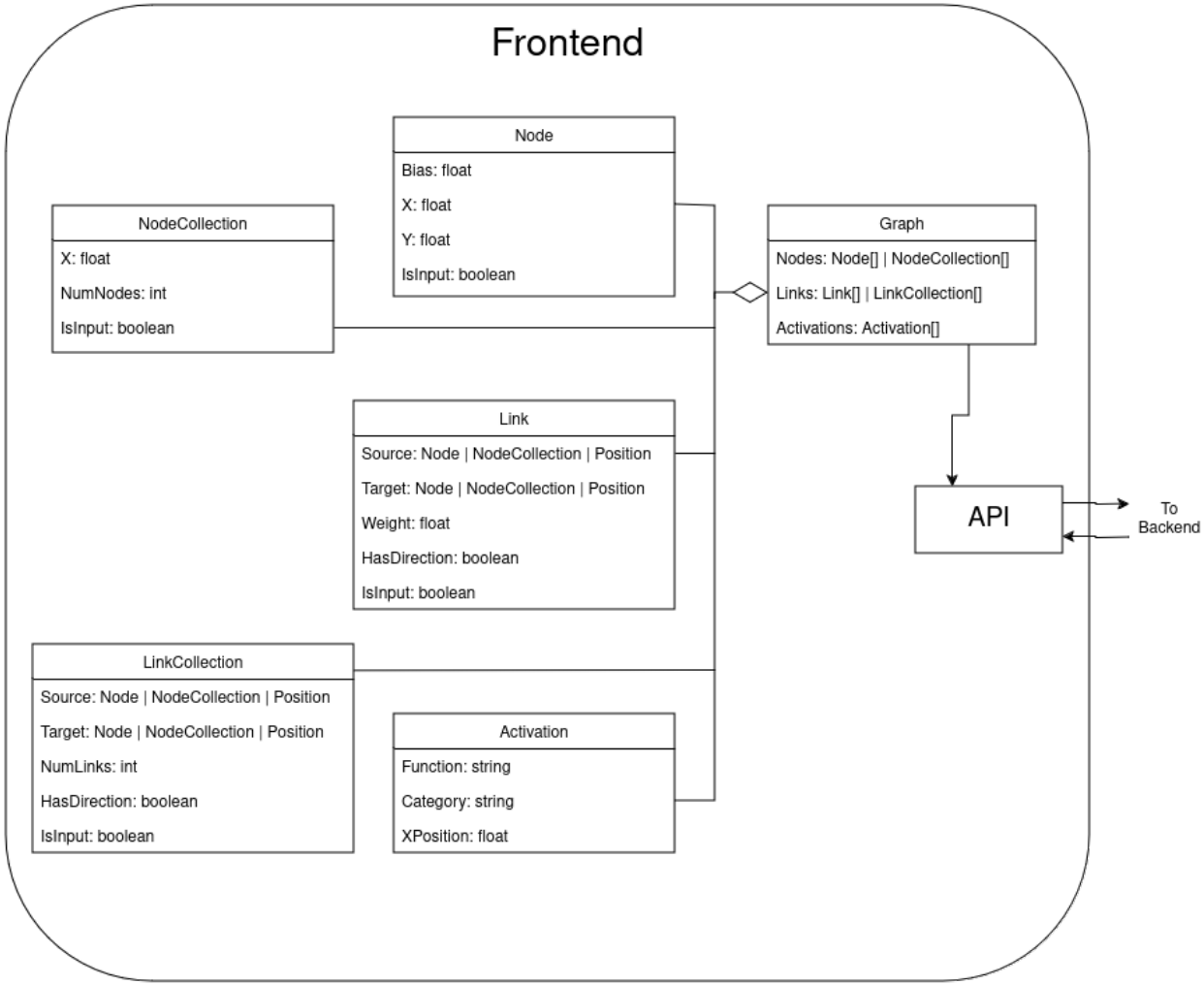
Non-Functional Requirements

- Large network layers are collapsed if they are too big to reasonably render.
- Invalid models are rejected and not stored on the server unnecessarily.
- Etc.

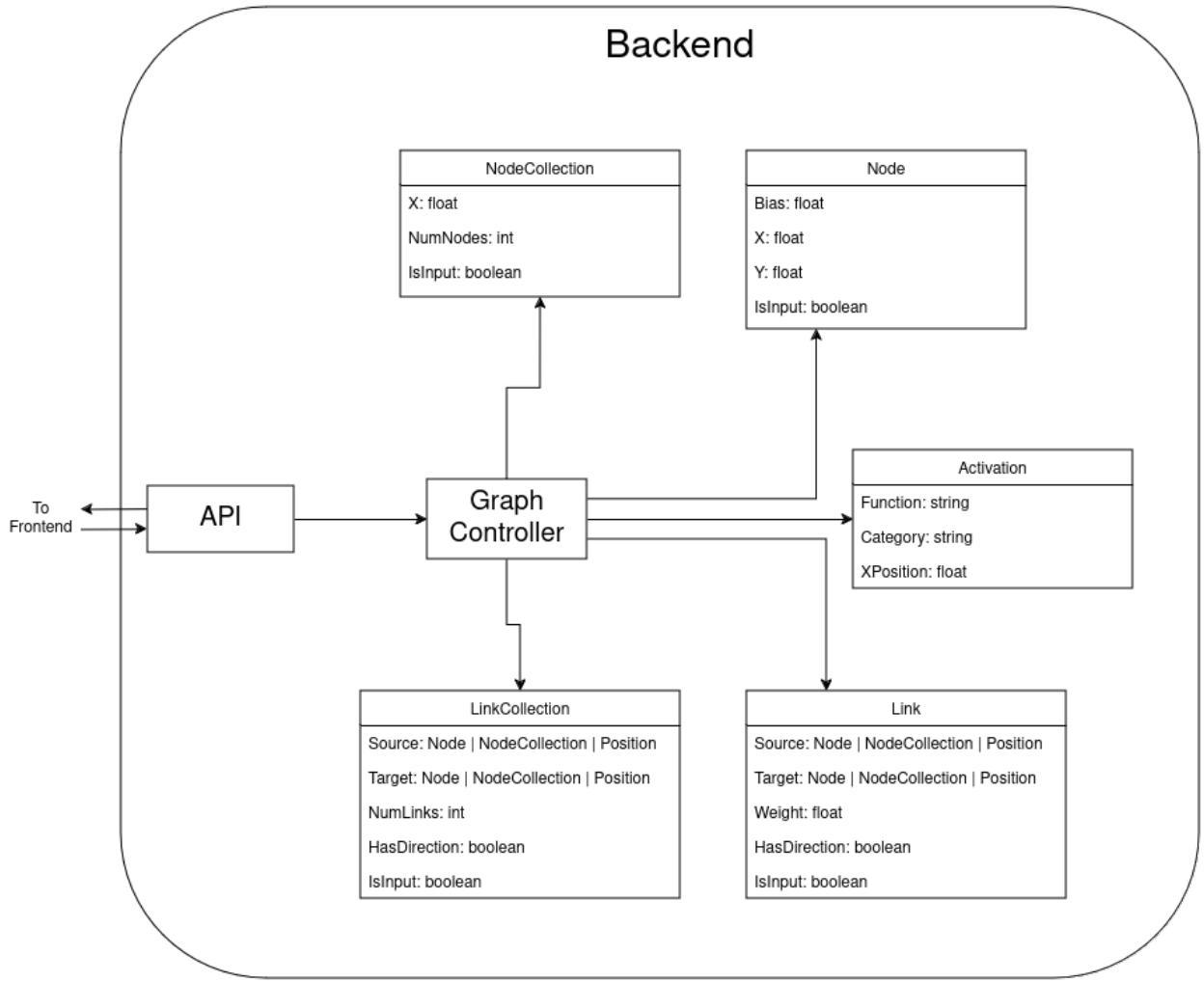
Web Application



Frontend Design



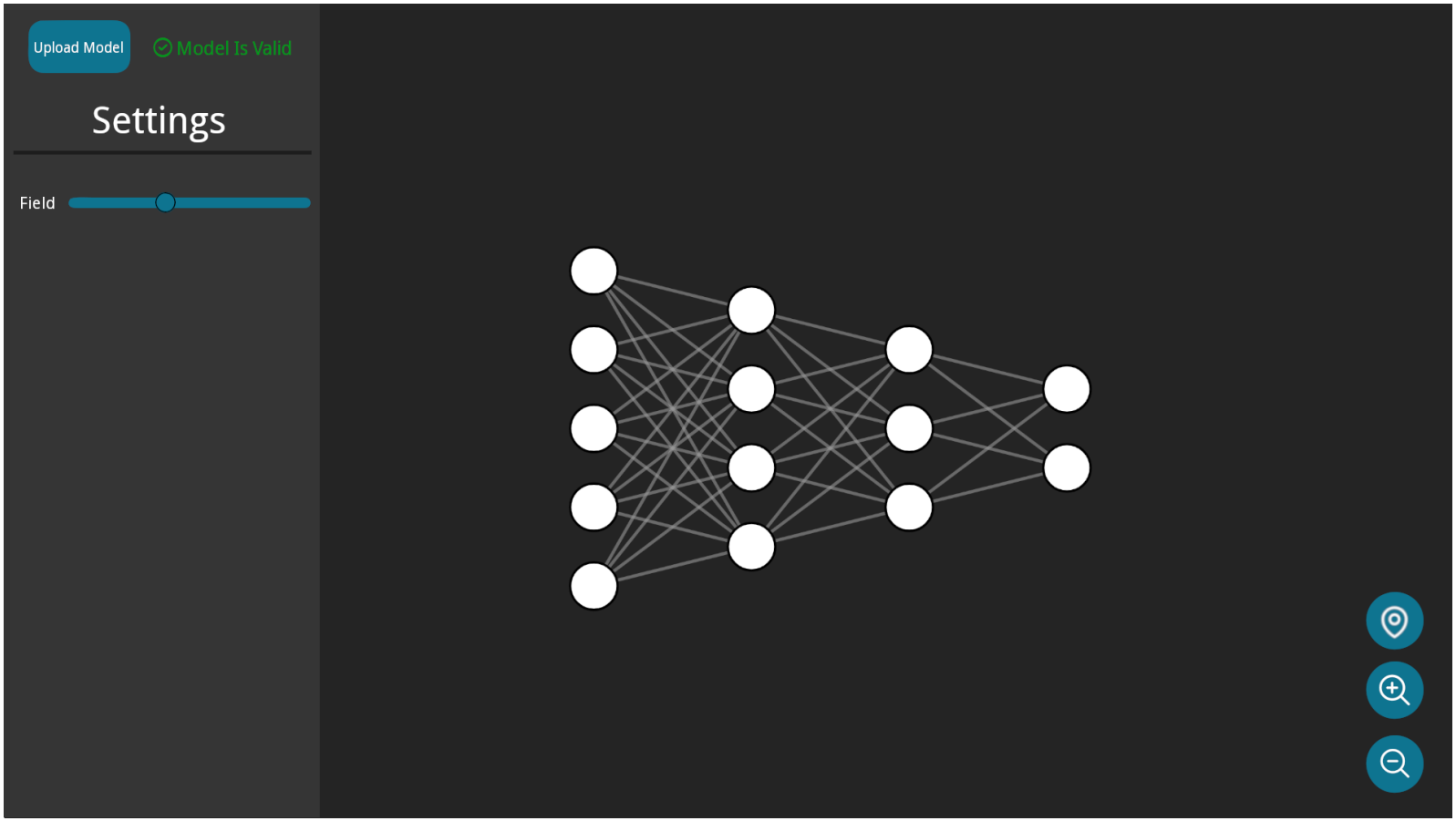
Backend Design



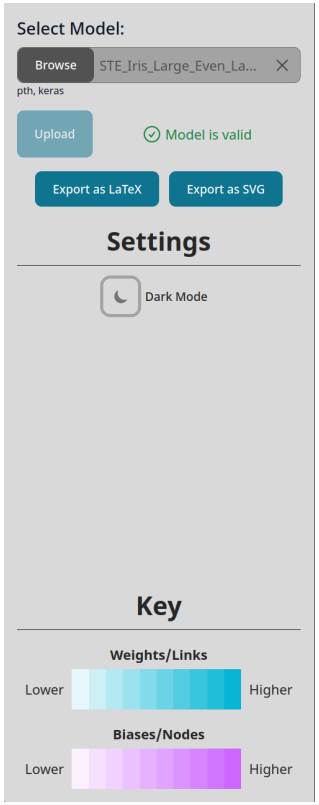
Database & Sessions

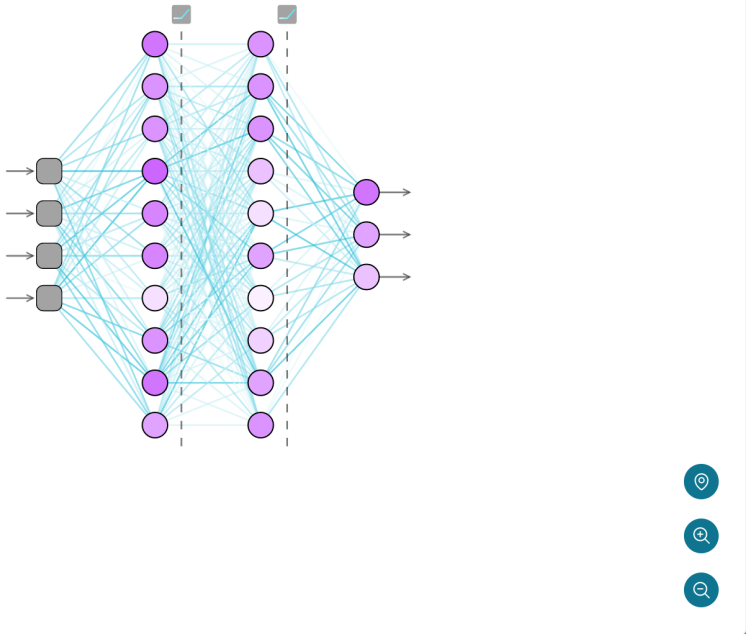
- _id
- graphs
  - nodes
  - edges
  - activations
- last_used

User Interface



User Interface





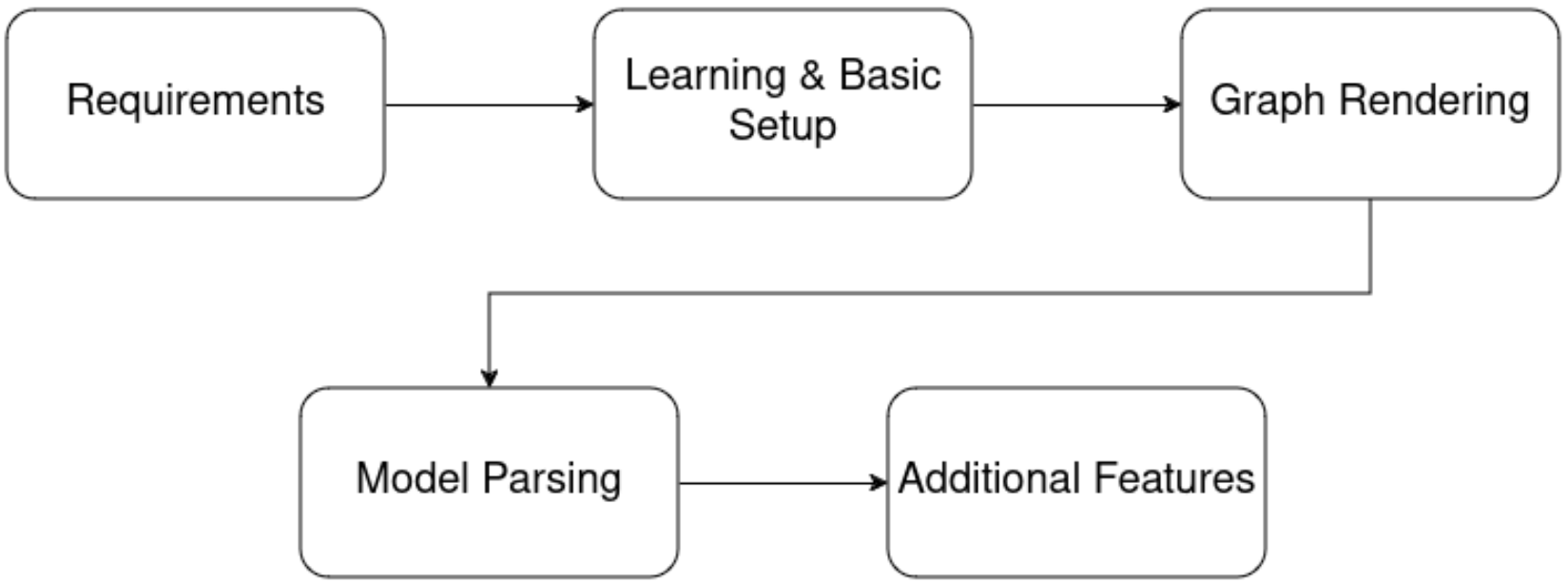
Frontend Technologies & Graph Generation

- Svelte
- Flowbite
- D3.js

Backend Technologies & Model Parsing

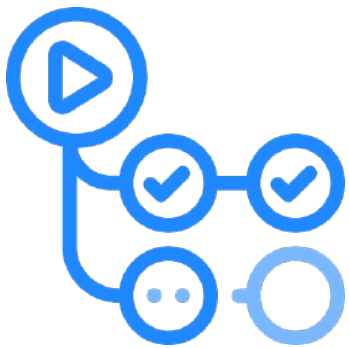
- Quart
- Keras
- PyTorch

Development



Deployment

- Ubuntu 22.04 LTS
- PM2
- GitHub Actions



Testing

- Frontend Unit Testing

Testing

- Frontend Unit Testing
- Backend Unit Testing

Testing

- Frontend Unit Testing
- Backend Unit Testing
- Regression and Integration Testing

Security

Web Application Security

- HTTPS
- White-List Parsing

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Session Management

- Anonymous
- Data Pruning

Challenges

- Lack of framework documentation

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- Information filtering

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- Information filtering
- Time management

Future Work

- Complex network types

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- Complex network types
- Additional frameworks

Future Work

- Complex network types
- Additional frameworks
- Animations

Thank you

Questions

Sources

- https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm
- https://www.mongodb.com
- https://en.wikipedia.org/wiki/File:Svelte_Logo.svg
- https://flowbite.com/
- https://github.com/d3/d3-logo/blob/master/d3.png
- https://github.com/koddr/quart-logo/blob/master/src/png/quart_short_logo_color.png
- https://en.wikipedia.org/wiki/File:Keras_logo.svg
- https://pytorch.org/
- https://ubuntu.com/
- https://pm2.io/
- https://github.com/