NeuraViz: A Web Application For Visualizing Artificial Neural Network Structures

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Artificial Neural Networks

What is supervised learning?

Artificial Neural Networks

What is supervised learning?

What is an artificial neural network?

Artificial Neural Networks
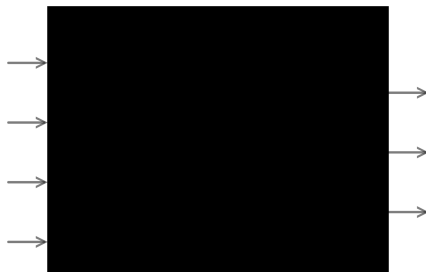
What is supervised learning?

What is an artificial neural network?

```python
self.linear_relu_sequential_model = nn.Sequential(
    nn.Linear(input_size, inner_layer_size),
    nn.ReLU(),
    nn.Linear(inner_layer_size, output_size)
)
```

Artificial Neural Networks
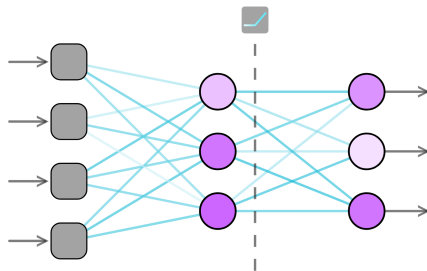
What is supervised learning?

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Artificial Neural Networks

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What is an artificial neural network?

NeuraViz

The Project

- What is it?

NeuraViz

The Project

- What is it?
- Why use it?

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Goals

- Breadth of supported models

NeuraViz

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- Ease of use

NeuraViz

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- What is it?
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Goals

- Breadth of supported models
- Ease of use
- Portability

Life Cycle Model

Models

- Waterfall

Life Cycle Model

Models

- Waterfall
- Iterative

Life Cycle Model

Models

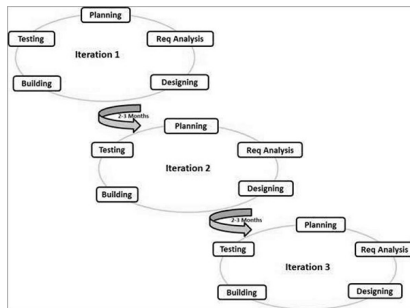- Waterfall
- Iterative
- Agile (Scrum)

Figure: Agile Model (TutorialsPoint)

Scrum Tweaks

- **Sprint Length:**

Scrum Tweaks

- **Sprint Length:** 1 week

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- **Standups:**

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- **Retrospectives:**

Scrum Tweaks

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

Process Technologies

Projects / NeuraViz / Scrum

Sprint 25

9 days remaining — Complete sprint

GROUP BY Stories — Insights — View settings

Add people — Quick filters

| BACKLOG 1	PROGRAMMING 2	TESTING REQUIRED 2	DONE
Add glossary	Add documentation/help page/landing page	Add security section of report	
0%	50%	75%	
NRVZ-63	NRVZ-53	NRVZ-61	
+ Create issue	Make revisions	Add conclusion section of report	
	25%	50%	
	NRVZ-65	NRVZ-62	
	+ Create issue		
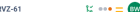
Requirements

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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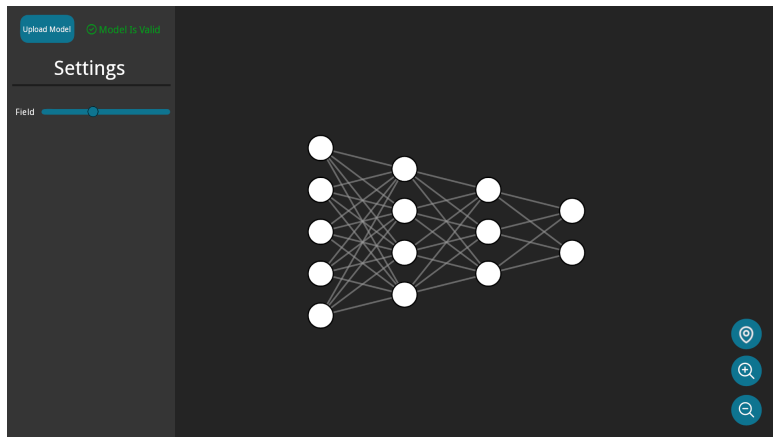- Etc.

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.
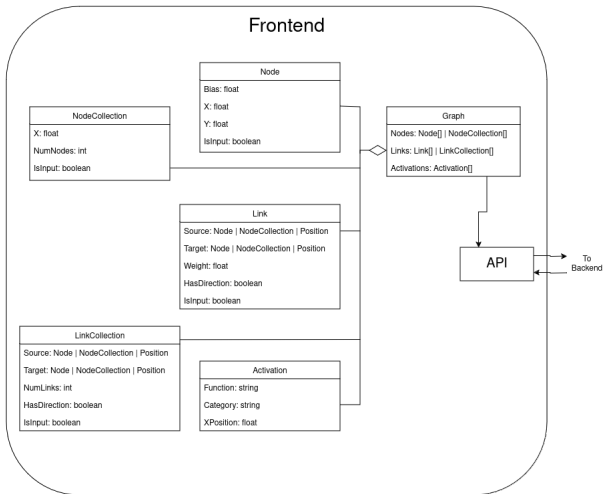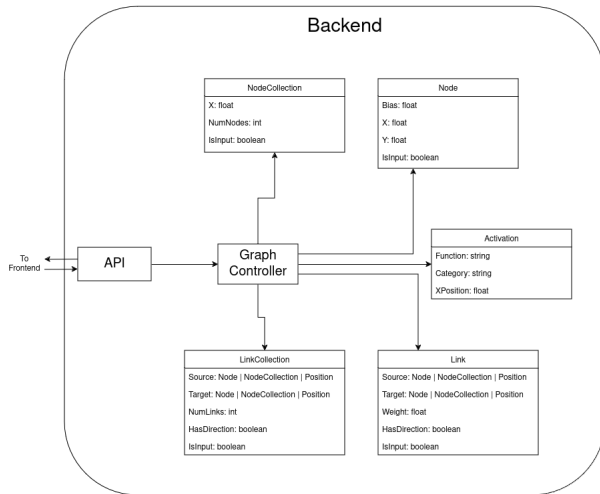- Etc.

Web Application
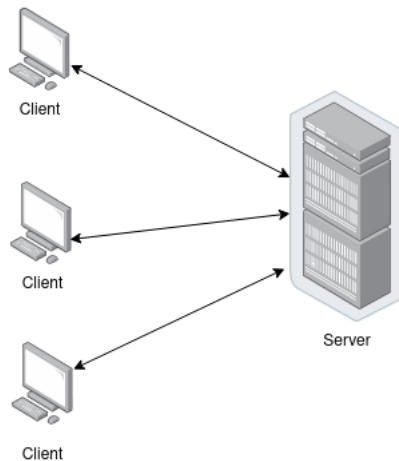
User Interface

Frontend Design

Backend Design

Database & Sessions

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

Frontend Technologies & Graph Generation

- Svelte
- Flowbite
- D3.js

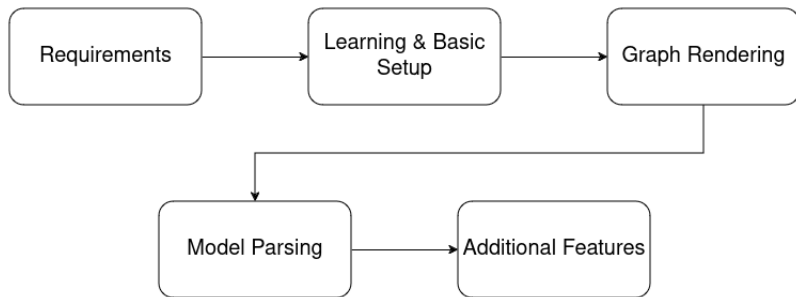# Backend Technologies & Model Parsing

- Quart
- Keras
- PyTorch

Development

User Interface
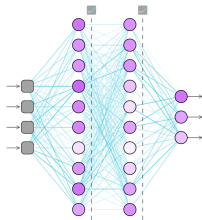
Deployment

- Ubuntu 22.04 LTS
- PM2
- GitHub Actions

Testing

- Frontend Unit Testing
  - Playwright
  - 27 automated tests
  - 20 manual tests

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- Backend Unit Testing
    - Pytest
    - 4 automated tests

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- Backend Unit Testing
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- Regression and Integration Testing

Security

Web Application Security

- HTTPS
- White-List Parsing

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- HTTPS
- White-List Parsing

Session Management

- Anonymous
- Data Pruning

Challenges

- Lack of framework documentation

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- Information filtering
- Time management

Future Work

- Complex network types
  - CNN
  - RNN

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  - RNN
- Additional frameworks

Future Work

- Complex network types
  - CNN
  - RNN
- Additional frameworks
- Animations

Thank you

Demo

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/