SigmaML

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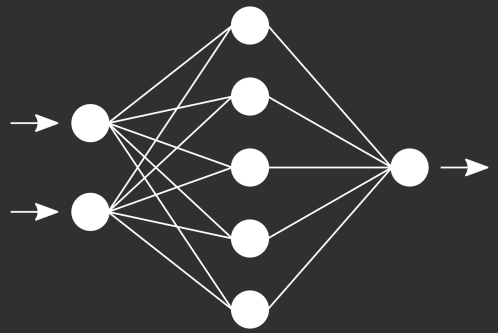
MACHINE LEARNING

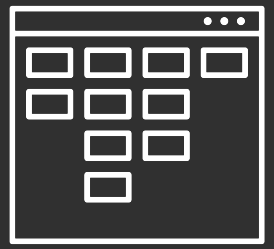
- How can algorithms designed to make predictions improve the accuracy of their decisions without explicit instructions?
  - In real life, problems don’t always fit in neat buckets
  - Perfect predictions aren’t possible, but how can we get close?
  - How can we encode “learning”?
- Neural Networks are an option!



BUILDING MODELS TODAY

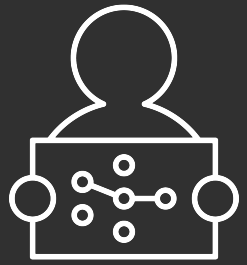
- We consider PyTorch as our primary machine learning framework
  - Future iterations may support Tensorflow
- Lack or interpretability for beginners
  - Development and experimentation with novel model architecture is difficult
  - Too much emphasis on how to implement, not how to structure the model itself
- Excessive boilerplate code
  - Boilerplate code = repetitive code that needs to be written in every program.
  - Leads to error-prone programs

GOALS



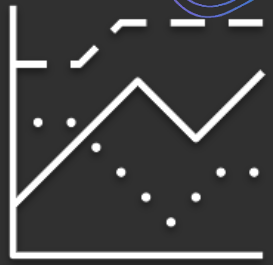
AGGREGATION

Reduce implementation complexity by organizing and combining related development steps.



EXPLAINABILITY

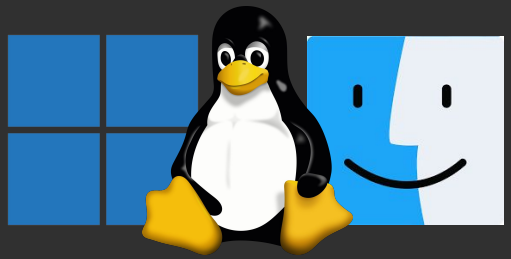
Allow for practitioners and beginners to develop a better intuition behind their models.



ANALYSIS

Encourage richer algorithmic analyses—steer emphasis away from "*just make it work*".

TOOLS & APPROACHES



CROSS-PLATFORM DESKTOP APPLICATION

We develop a lightweight cross-platform compatible desktop application that aids in the machine-learning development process.

WEB-BASED TECHNOLOGY

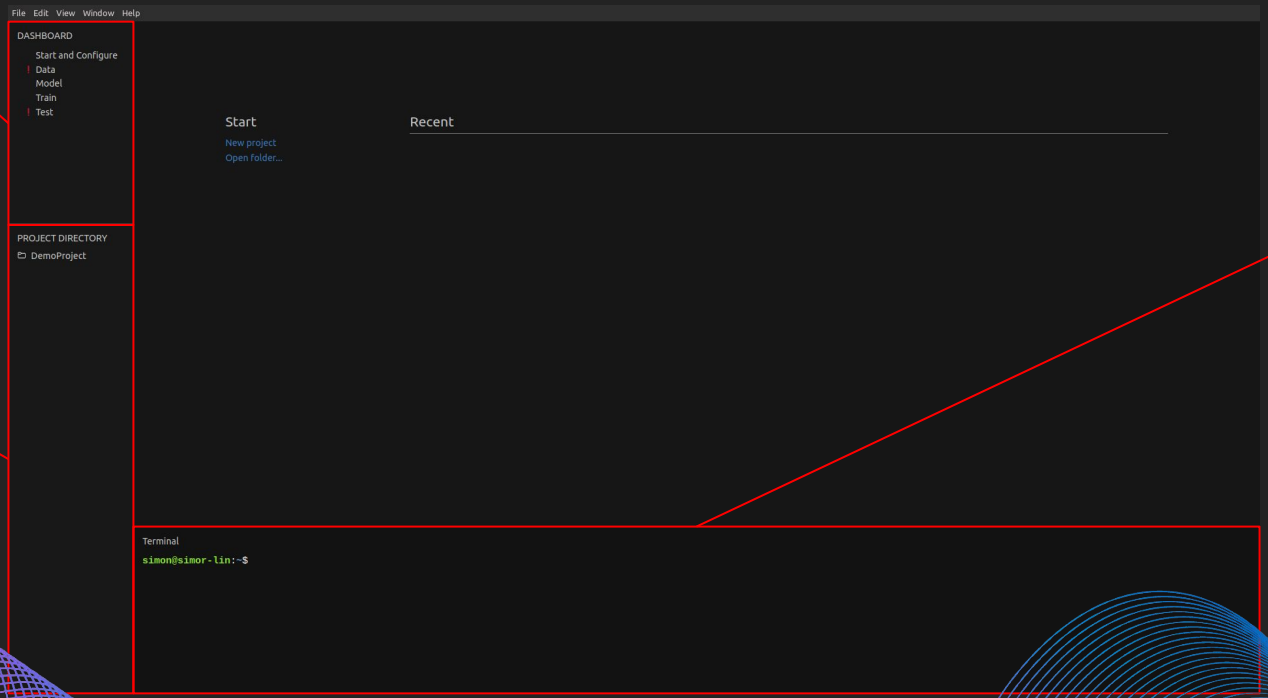
Built with a flexible web-based front-end, we bundle all fundamental functionality into an intuitive UI and a modular structure that allows for future expansion.

APP & PROJECT STRUCTURE

Project Dashboard

Project Directory Tree

Fully Integrated Terminal



DATA PROCESSING & DEMO

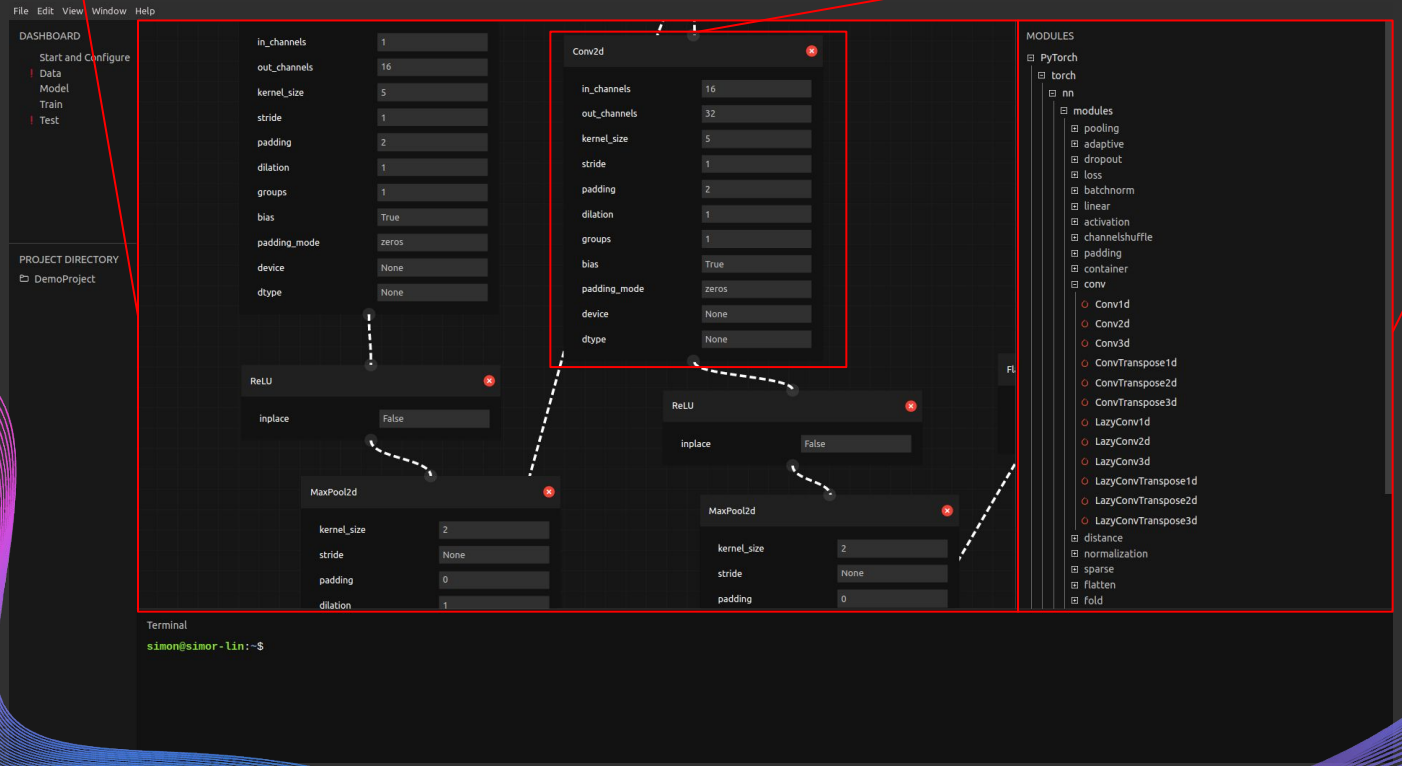
- MNIST
- Handwritten digit classification
- Data is pre-processed
- Future versions will allow for basic preprocessing

MODEL BUILDING

Interactive Graph-based Model

Adjust individual node parameters

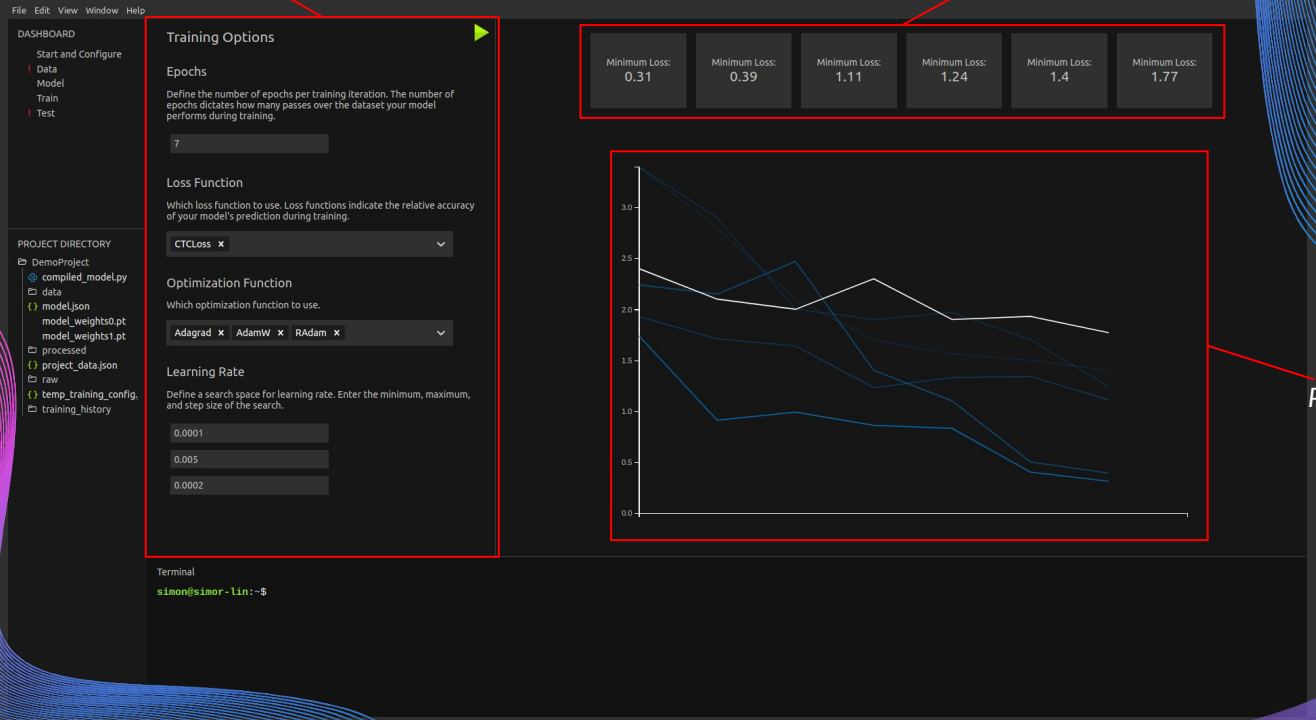
Drag-and-drop **Pytorch** Module Menu



TRAINING

Define a search space and training parameters.

Top 5 hyperparameter combinations *(and most recently trained)*



Generalization curve*
Plot loss over training set(s) over the desired number of epochs

FUTURE DIRECTIONS

- Further modularize
- More thorough data pre-processing tools
- Built-in test sets and demo models
- VCS integration
- More dynamic model building tools
- Tips and tutorials
  + Step-by-step explanations and suggestions