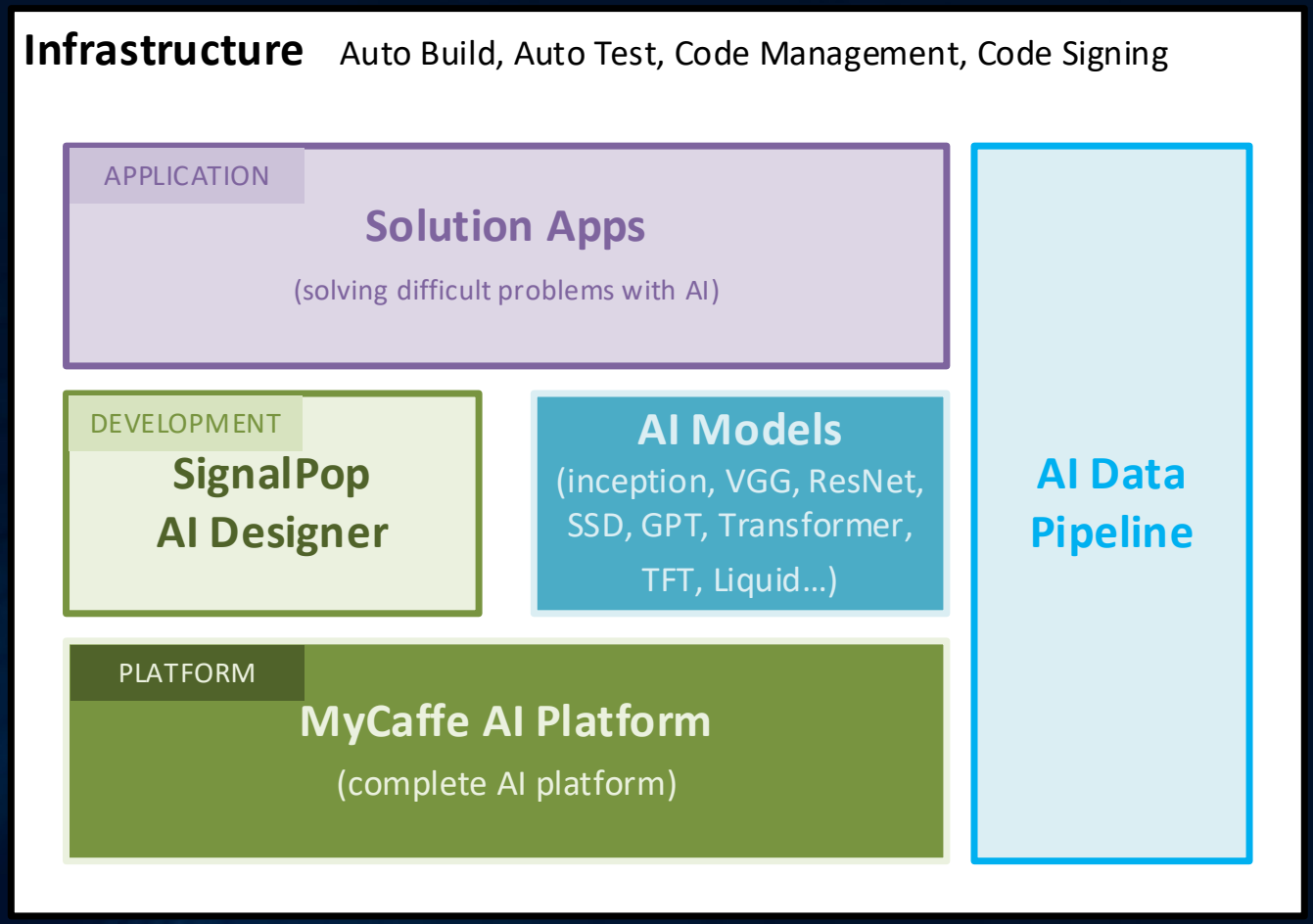
SIGNALPOP

THE AI SOLUTION PLATFORM

Full Stack Artificial Intelligence

From concept to solution, using a highly modular, hardware (GPU) independent ai platform.

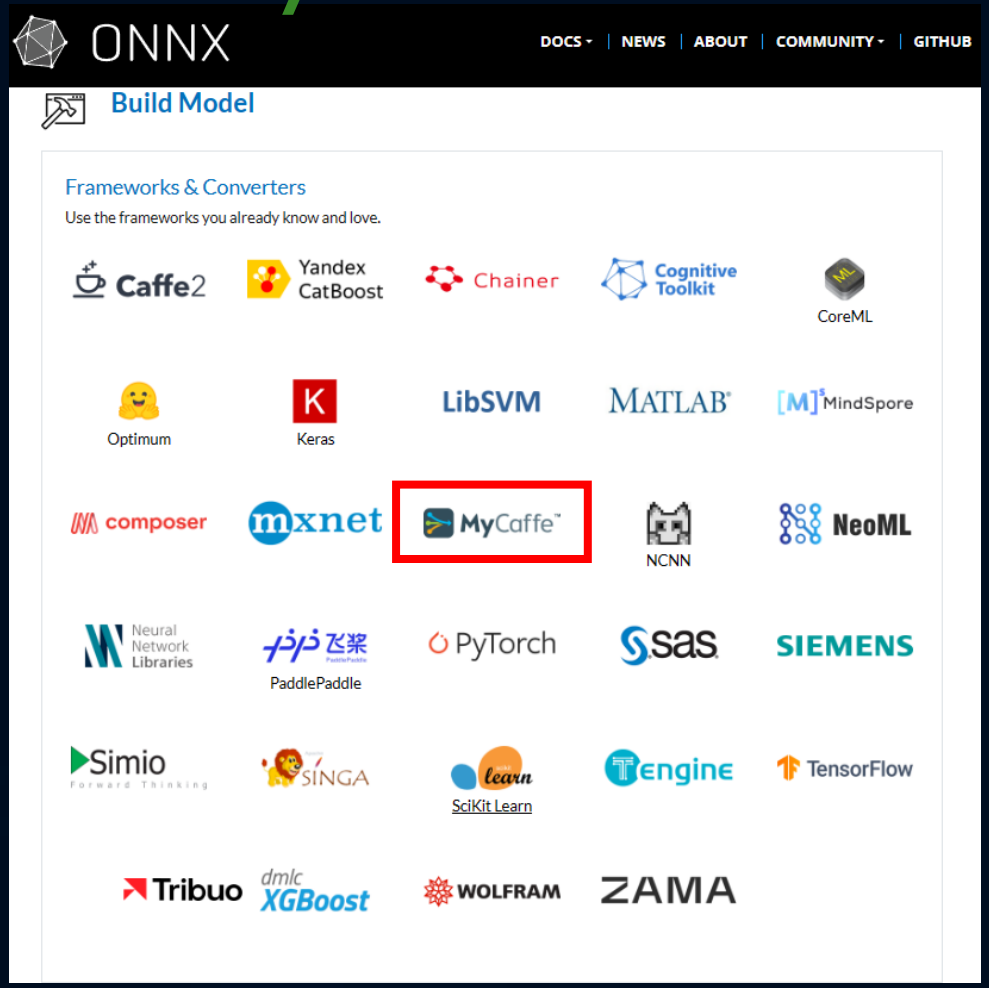


MyCaffe AI Platform

FULL STACK ARTIFICIAL INTELLIGENCE

Hardware Independent AI – MyCaffe AI Platform

- Open-source, complete AI Platform.
- Functionality and layer support matches PyTorch
- Supports Microsoft ONNX (click →)
- Supports Export to Python/PyTorch (new)
- Supports easy Windows C# and Python application integration in a few lines of code.
- Fast – Trading Studio processes 50,000+ data points in under 50 ms on high end GPU's
- Over 40,000 downloads on NuGet



https://onnx.ai/supported-tools.html#buildModel

© 2023 SignalPop LLC. All rights reserved.

Hardware Independent AI – MyCaffe AI Platform

- **Supports all main branches of AI**
  - Classification
  - Regression
  - Siamese Networks
  - Triplet Networks
  - Neural Style Transfer
  - Reinforcement Learning
  - Recurrent Learning
  - Object Detection
  - Transformers
  - Encoder/Decoder
  - GPT
  - Language Translation
  - Temporal Fusion Transformers
  - Liquid Neural Networks
- **All supported natively in MyCaffe with examples**

© 2023 SignalPop LLC. All rights reserved.

Hardware Independent AI – MyCaffe AI Platform

Company		Languages					Base Features				
		C++	C#	Python	R	Java	Text Mode	Programmed Model	CUDA Support	#C Layers	Plugin Support
MyCaffe	**SignalPop**		x	x			x	x	x	x	x
TensorFlow	Google	x	x	x	x	x		x	x		
PyTorch	Facebook	x		x				x	x		
ONNX	Microsoft	x	ltd.	x			binary	x	x		
CNTK	Microsoft	x	x	x				x	x		

Company		Classic Model Features						
		Classification	Regression	Recurrent Learning	Reinforcement Learning	Triplet Nets	Siamese Nets	Transfer Learning
MyCaffe	**SignalPop**	x	x	x	x	x	x	x
TensorFlow	Google	x	x	x	x	x	x	x
PyTorch	Facebook	x	x	x	x	x	x	x
ONNX	Microsoft	x	x	x	x	x	x	x
CNTK	Microsoft	x	x	x	x	?	?	?

Company		Modern Model Features				
		Object Detection	Transformers GPT	Transformers Enc/Dec	TFT Learning	Liquid Net Learning
MyCaffe	**SignalPop**	x	x	x	x	x
TensorFlow	Google	x	x	x	third party	third party
PyTorch	Facebook	x	x	x	third party	third party
ONNX	Microsoft	x	x	x	?	?
CNTK	Microsoft	x	x	?	?	?

https://en.wikipedia.org/wiki/Comparison_of_deep-learning_software

© 2023 SignalPop LLC. All rights reserved.

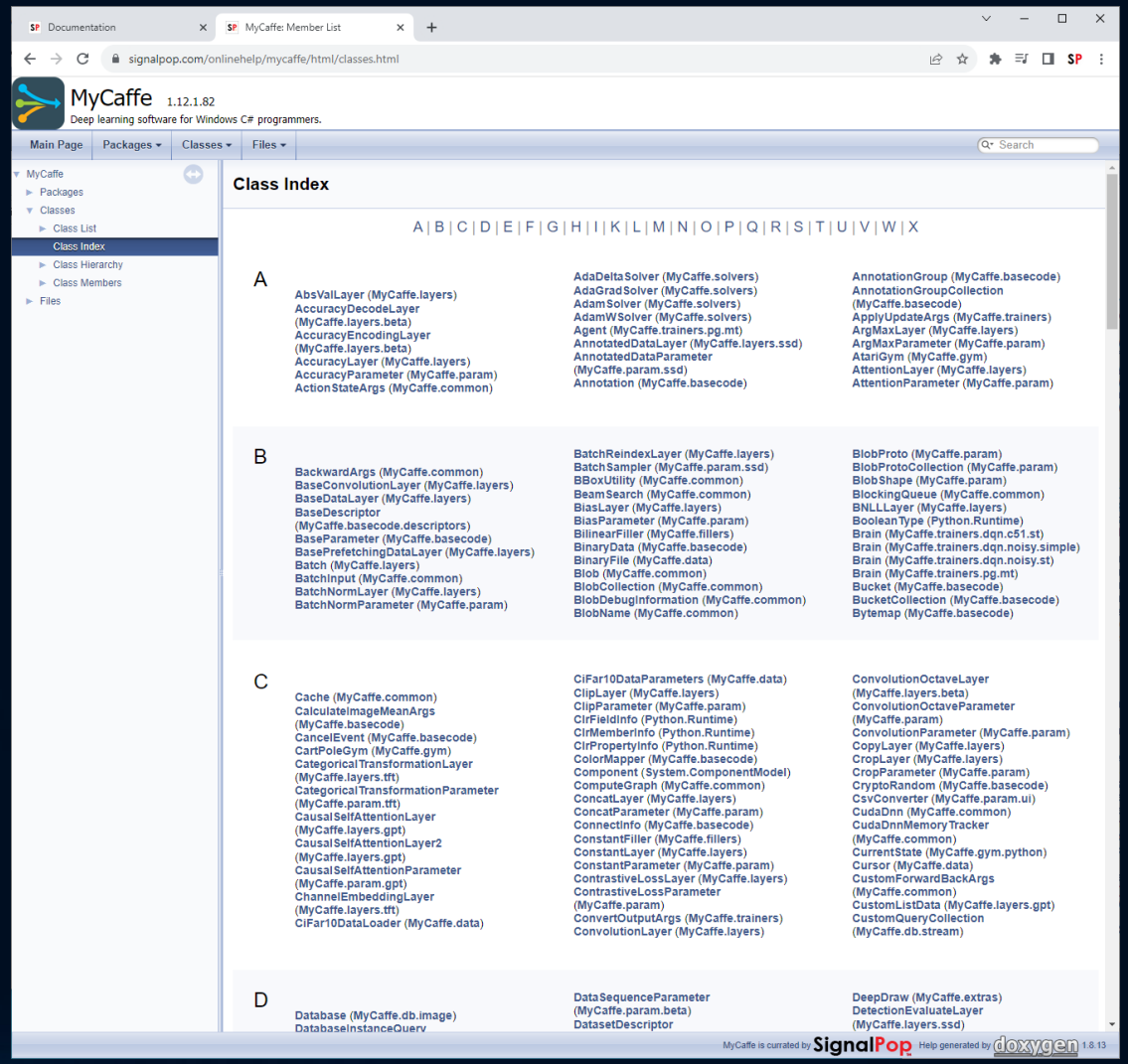
Hardware Independent AI – MyCaffe AI Platform

- **Secure** AI Platform – all MyCaffe all modules are carefully managed, and code signed.
  - 2023 PyTorch poisoned with malicious code…
    PyTorch dependency poisoned with malicious code • The Register The Weak Link: Recent Supply Chain Attacks Examined (cyberint.com)
- **Deep multi-threading support** – .NET has rich multi-threading support for complex system level software.
  - Python GIL prevents multiple threads, whereas .NET supports Threads, Fibers, Async, Locking, Events…
    GlobalInterpreterLock - Python Wiki
- **Explainability** – visualized live model architectures, visualized debugging, and open gradient calculations in backward pass.
  - Chuck Schumer Wants AI to Be Explainable.
    Schumer Wants AI to Be Explainable. It's Harder Than It Sounds | Time
- **Performance** – easily low-level software access making customized GPU level optimizations not only possible but easy to do.
  - Create Extension, Run Extension
- **Hardware Independent** – hardware dependencies localized to a single replaceable Plug-n-Play DLL that is replaceable at runtime.
  [1810.02272] MyCaffe: A Complete C# Re-Write of Caffe with Reinforcement Learning (arxiv.org)

© 2023 SignalPop LLC. All rights reserved.

Hardware Independent AI – MyCaffe AI Platform

- Hundreds of Classes
- In-Memory Databases for high-speed training
- Data Gyms for dynamic training
- Highly modular
- NuGet Package for quick and easy deployment
- Over 1,500 automated tests
- All binaries code-signed

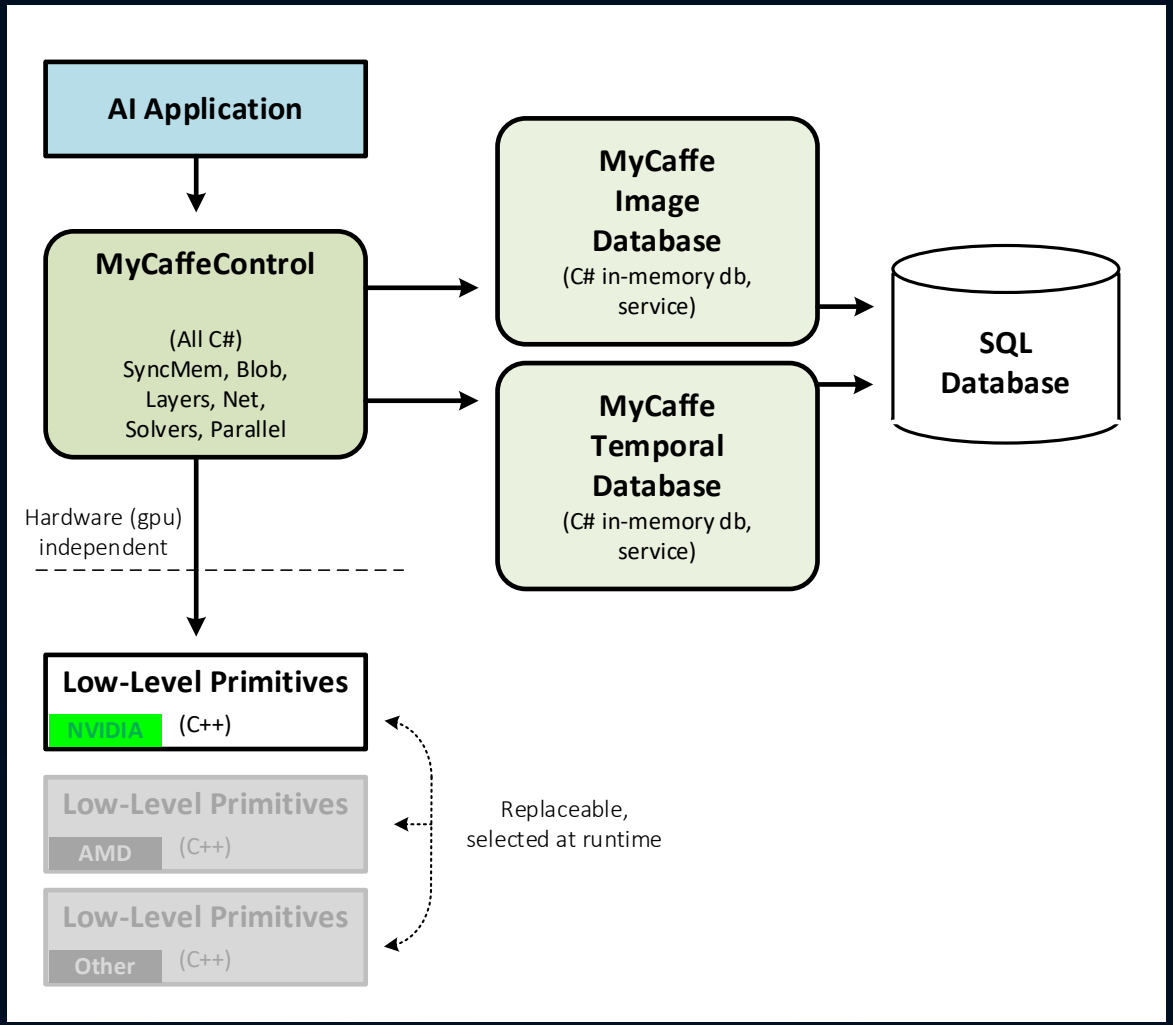


https://www.signalpop.com/onlinehelp/mycaffe/html/classes.html

© 2023 SignalPop LLC. All rights reserved.

Hardware Independent AI – MyCaffe AI Platform

- **Hardware (GPU) Independent** AI Platform.
- Currently supports NVIDIA GPUs top to bottom, ready to support AMD, Intel and others.
- Hardware dependencies localized to a single replaceable DLL that is replaceable at runtime.
- Train on one hardware platform…
- …Inference on another…
- …while retaining value of AI software application investments.
- Click image → for more information.



https://arxiv.org/abs/1810.02272

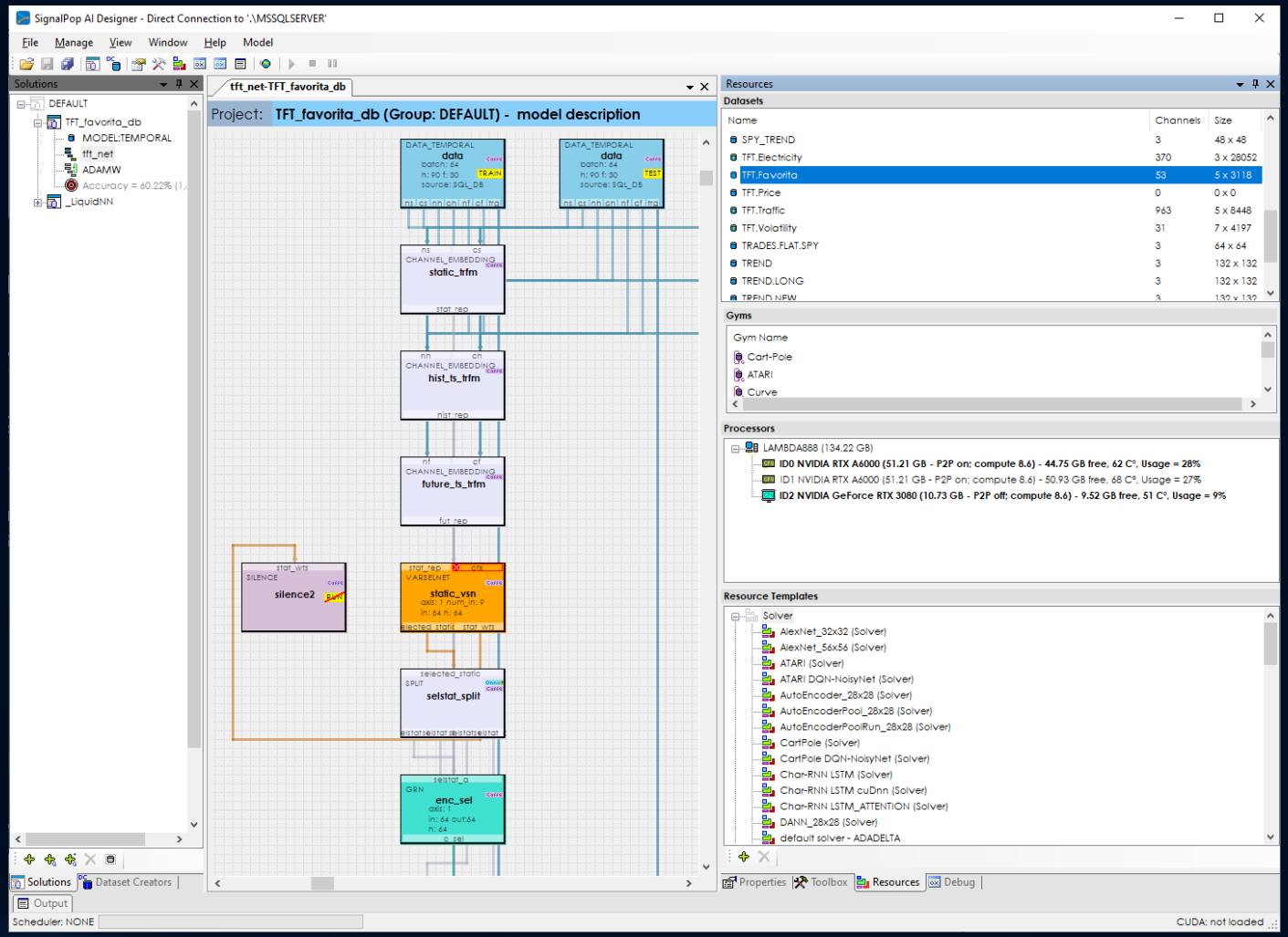
© 2023 SignalPop LLC. All rights reserved.

SignalPop AI Designer

FULL STACK ARTIFICIAL INTELLIGENCE

Unlocking the Black Box – SignalPop AI Designer

- **Unlocking the Black Box** – elevating transparency and enhancing understating of AI models with advanced visual insights and user-friendly development tools.

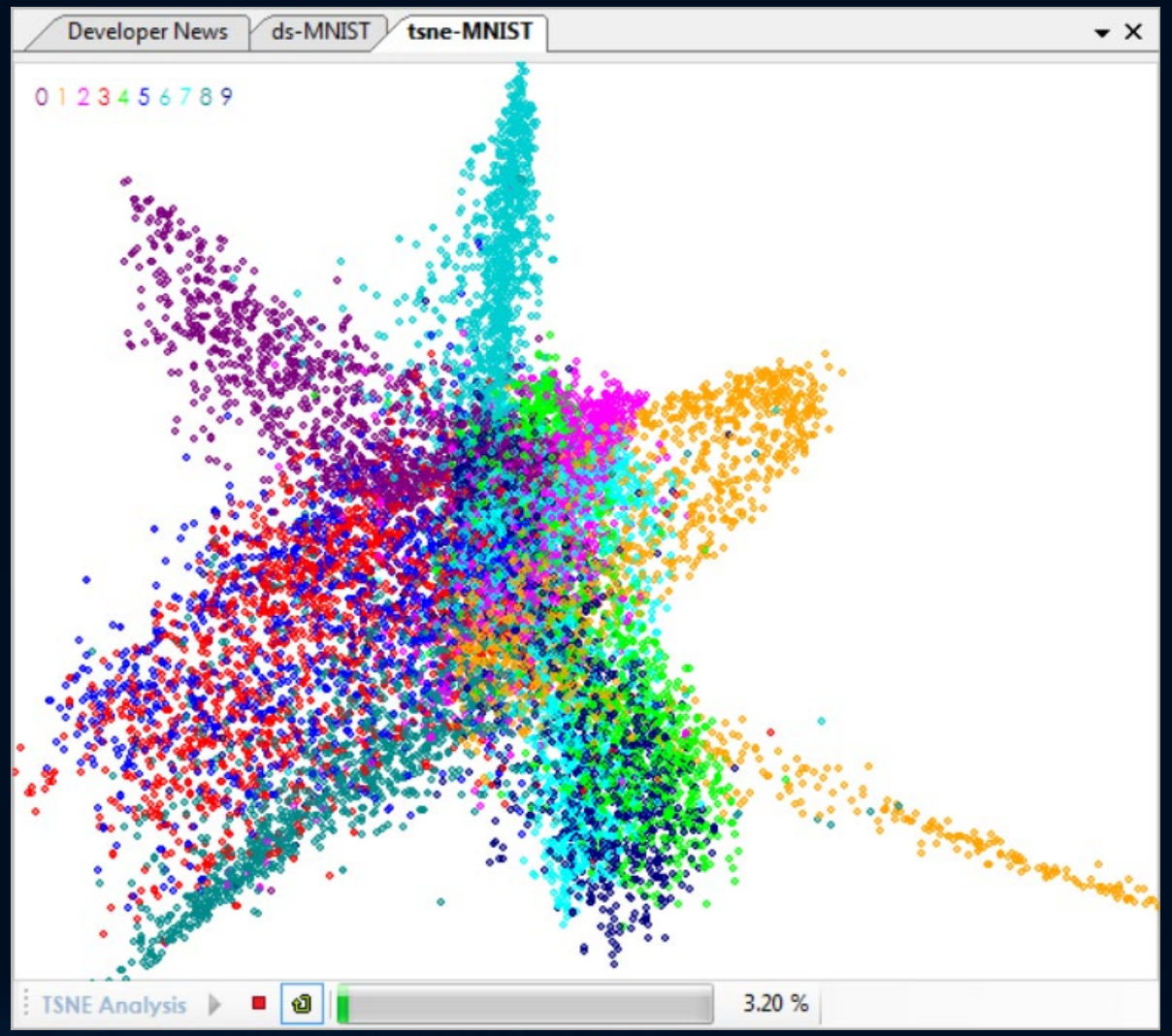


Click to visit User Guide Document

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Visual representation of complicated Data Sets
- Using TSNE and PCA
- Visually shows learnability of each data set.
- Click on the image → to see animation.

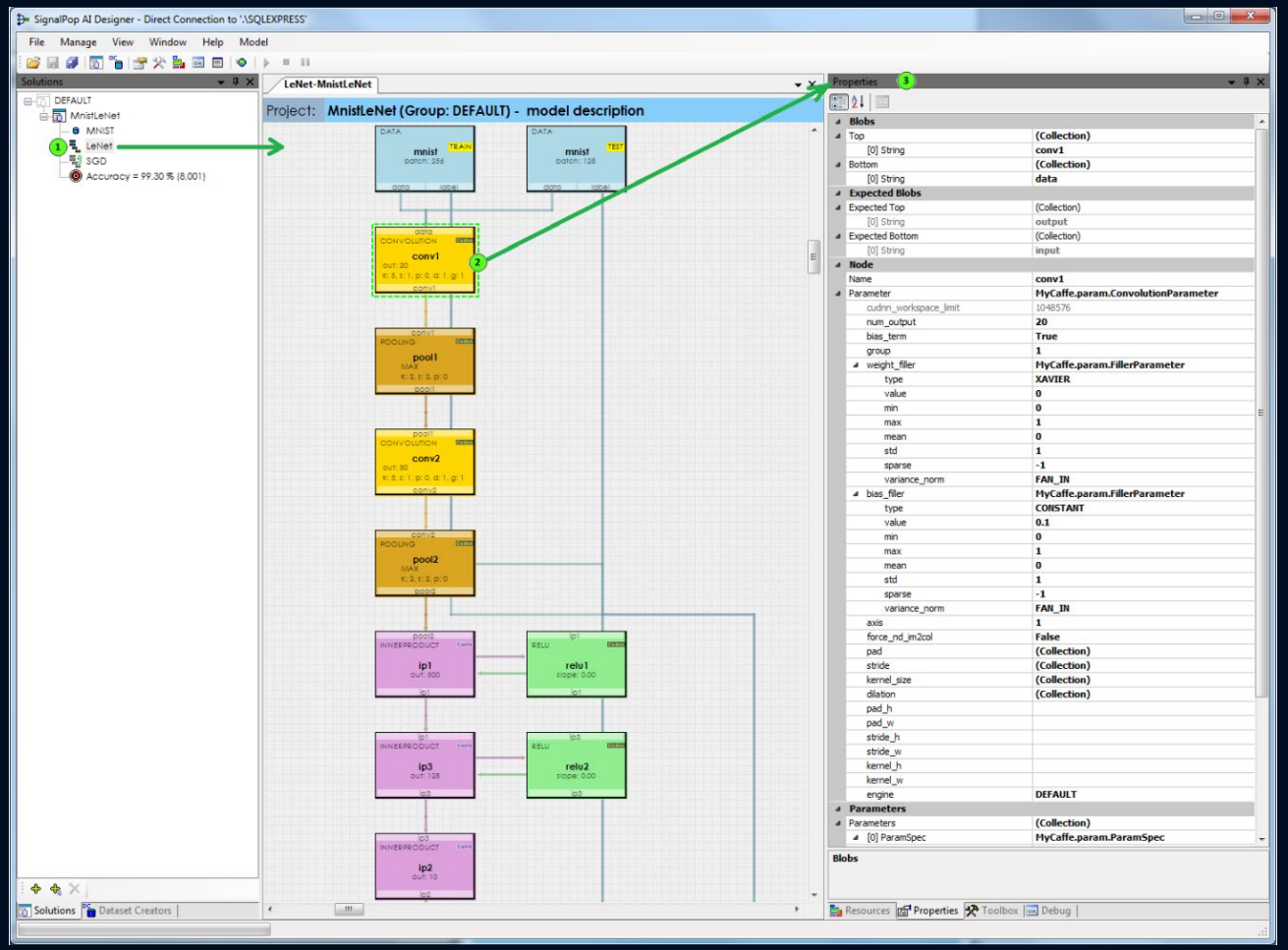


https://www.youtube.com/watch?v=tFsyXwrspHQ

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Visual representation of complicated AI Models
- Drag-n-drop AI Model development
- Detailed AI Model Configuration
- Easy AI Model integration into Windows C# applications using the MyCaffe AI Platform

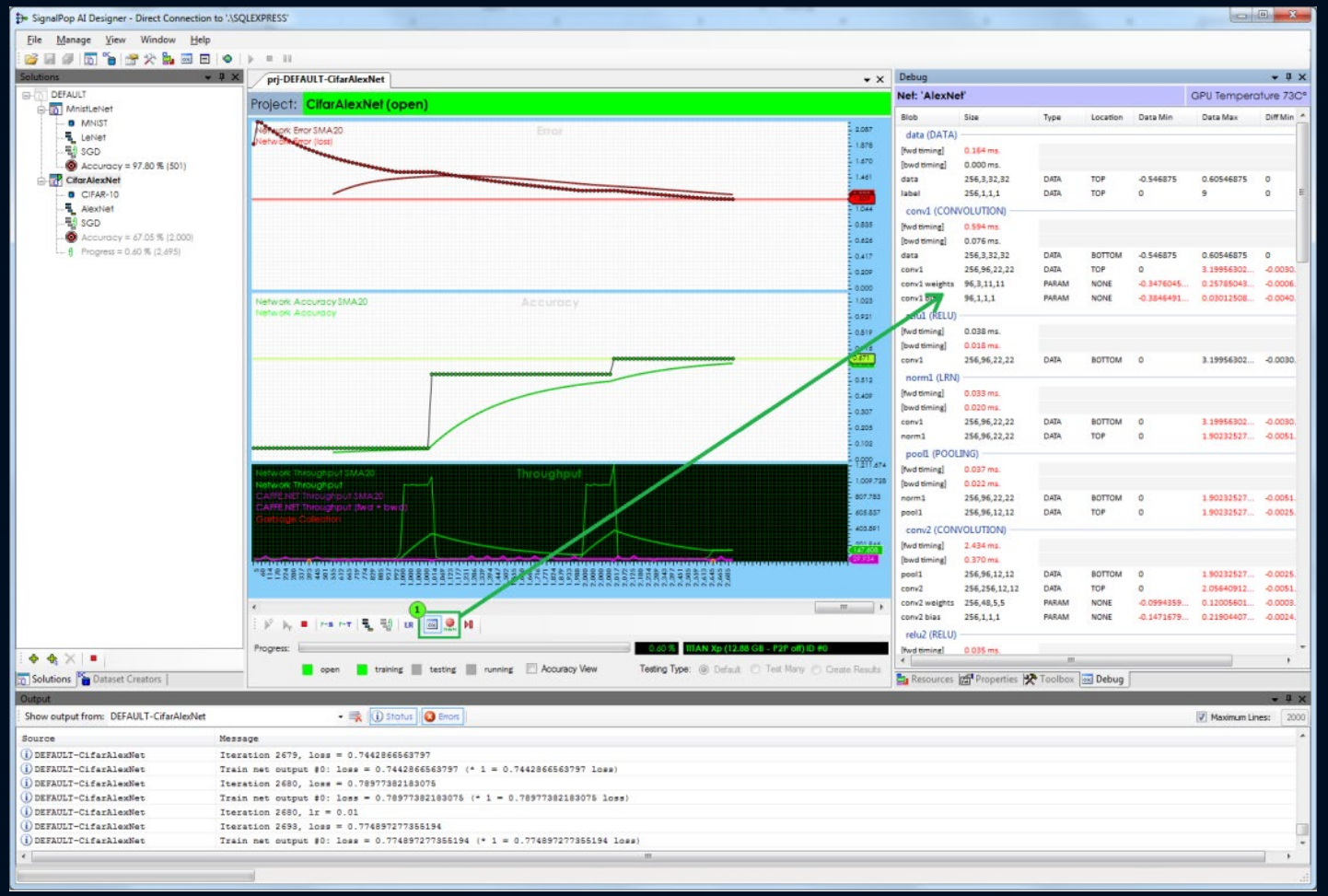


Click to visit User Guide Document

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Multi-threaded AI Model training.
- Train multiple models at once.
- Leverage multiple NVIDIA GPUs
- All NVIDIA GPUs supported.

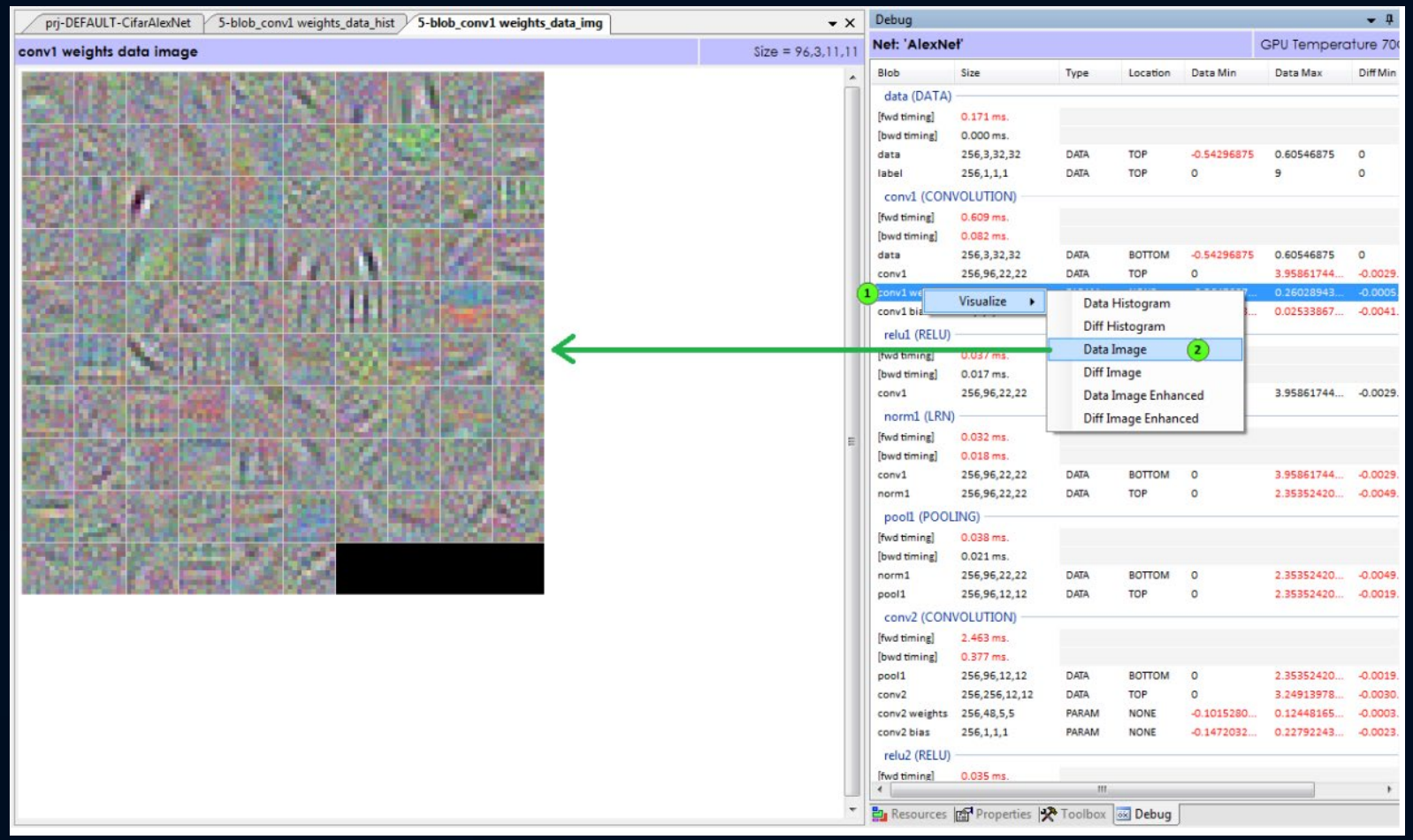


Click to visit User Guide Document

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Real-time AI Model debugging.
- AI Model debugging visualizations at a Model Layer level.
- AI Model debugging visualizations at a Blob level.
- Timing analytics per layer.
- Model impact visualizers to help diagnose model effectiveness.

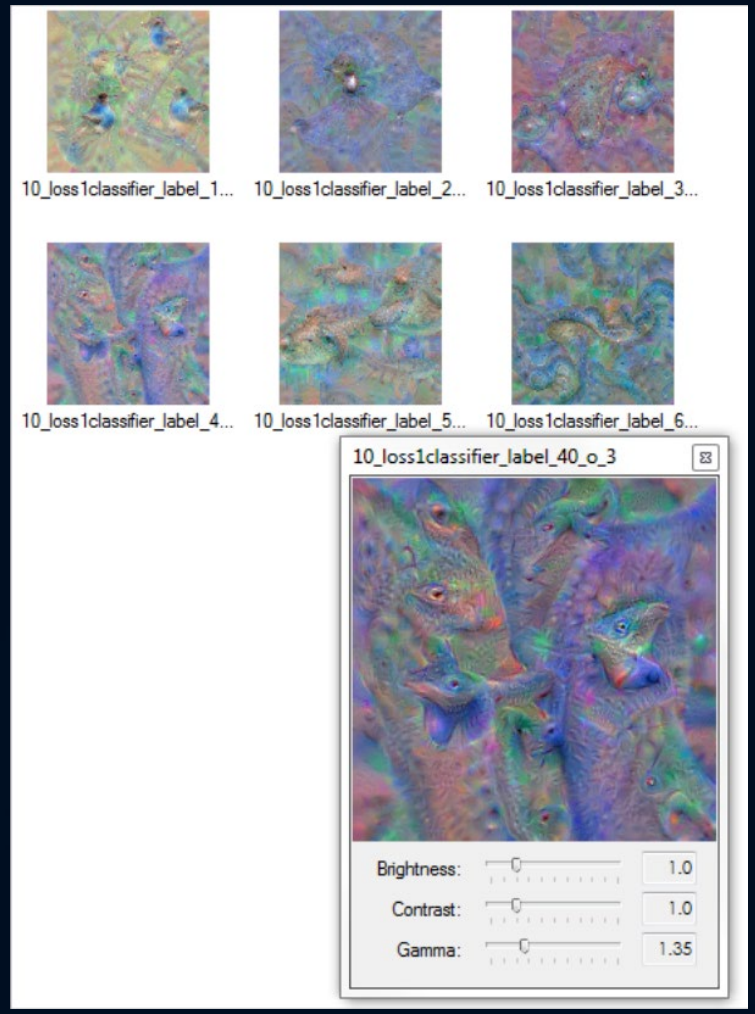


Click to visit User Guide Document

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Visualizing what the neural network sees.
- - using Google Dream.
- - using Model Reversing.
- Click on image → to see animation.

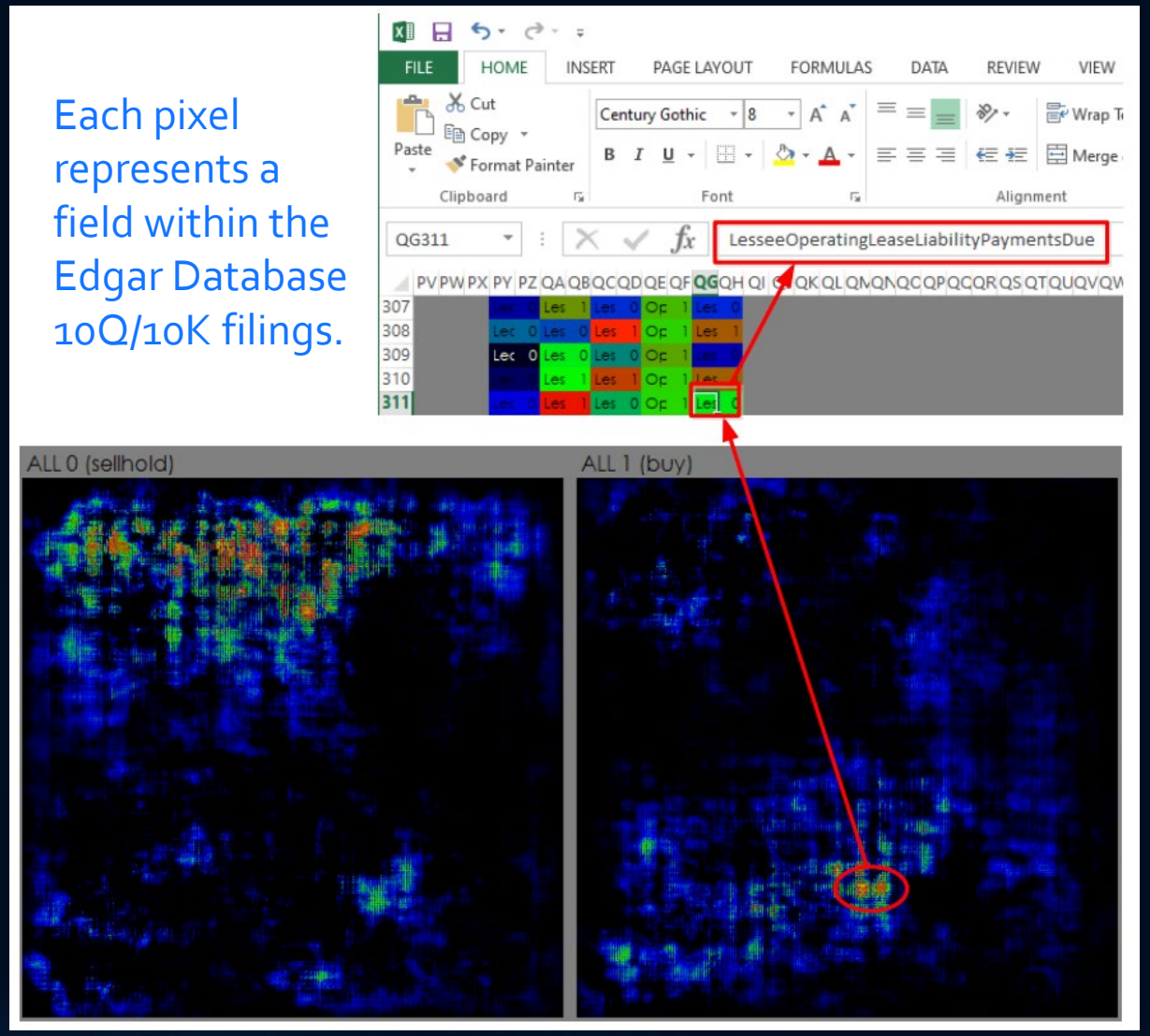


https://www.youtube.com/watch?v=9rhnchNs6Ho&t=2s

© 2023 SignalPop LLC. All rights reserved.

Unlocking the Black Box – SignalPop AI Designer

- Turning visualizations into valuable insights.
- Using MyCaffe to mine the Edgar Database….
- … to predict when a Sovern Wealth Fund buys and sells…
- **… and understand why.**
- Click on image → to learn more.



https://www.signalpop.com/2021/10/01/using-mycaffe-to-mine-the-edgar-database/

© 2023 SignalPop LLC. All rights reserved.

AI Models and Examples

FULL STACK ARTIFICIAL INTELLIGENCE

Making AI Work – AI Models and Examples

- We cover a wide spectrum of models including GPT, Transformers, Encoder/Decoder, Reinforcement Learning and more, excelling particularly in Time Series Prediction with **Temporal Fusion Transformers** (TFT) and **Liquid Neural Networks** (LNN) – key to unlocking exceptional real-world solutions.

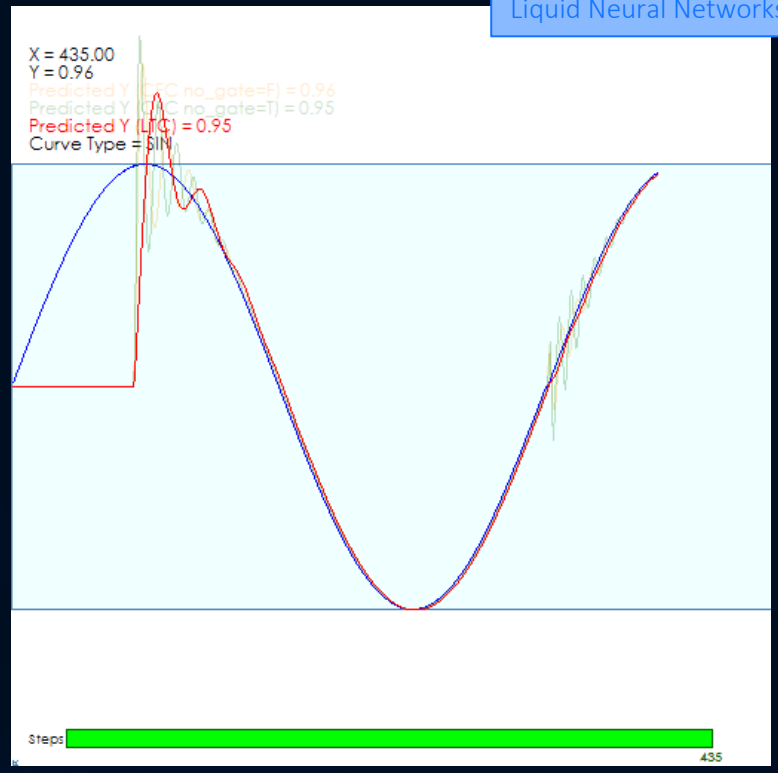
Temporal Fusion Transformers

TFT Favorita product demand flow Predictions

TFT Favorita Historical Variables Temporal View

https://www.signalpop.com/2023/06/09/tft/

Liquid Neural Networks

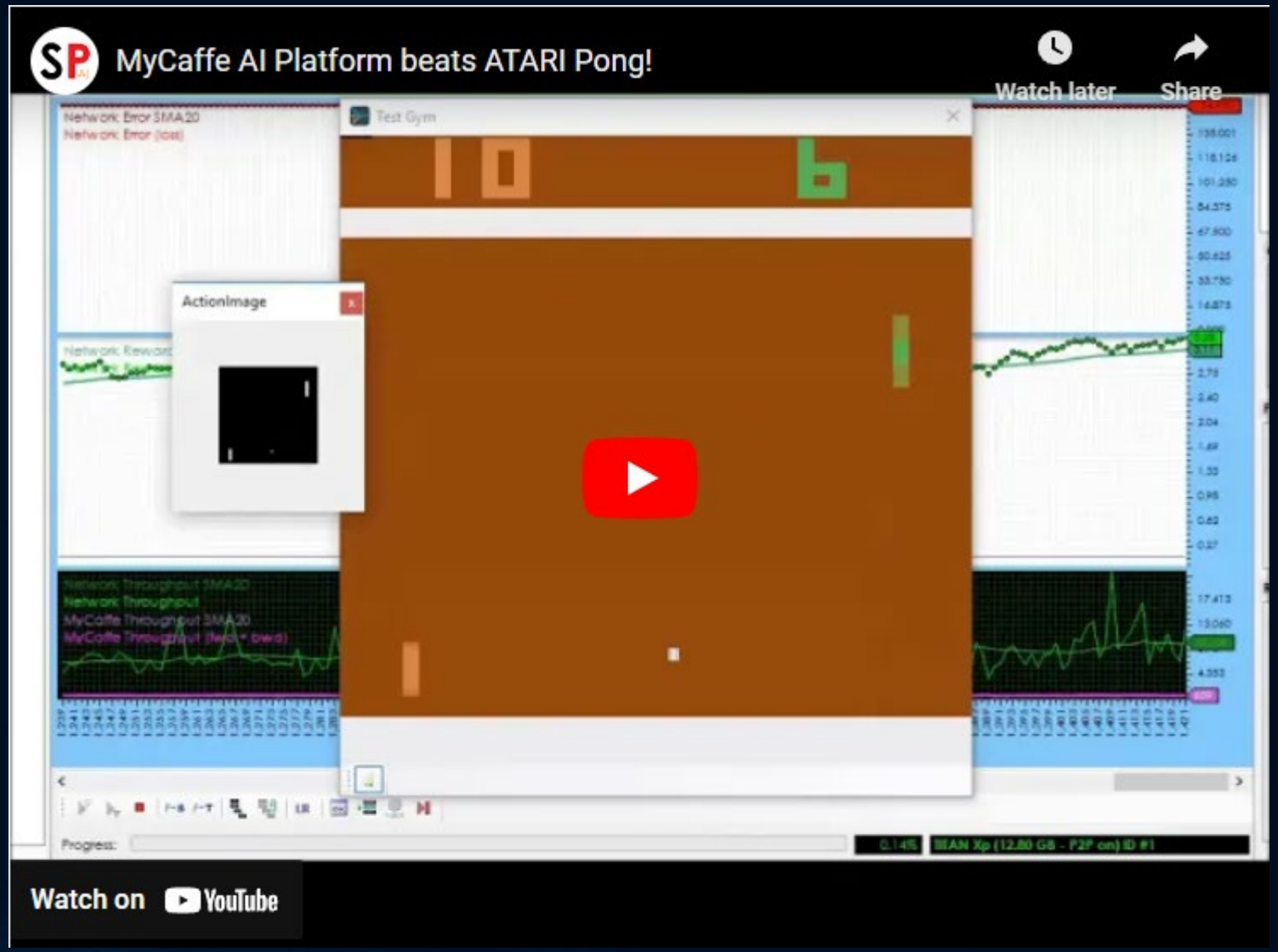


https://www.youtube.com/watch?v=juiX5cFoLOs

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Reinforcement Learning**
  - Using a policy gradient reinforcement learning model, MyCaffe is able to beat the game Pong just from the images of the game.
  - Click on the image -> to see this in action.



https://www.youtube.com/watch?v=hSv8Gk72R-Y&t=55

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Object Detection**
  - Using single-shot multi-box models, MyCaffe detect gas leaks from drone footage flying over a natural gas field.
  - Click on the image -> to see this in action.

https://www.youtube.com/watch?v=CJGg9O7sIpI&t=1s

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **GPT**
  - Using a GPT transformer model, MyCaffe generates a Shakespeare sonnet.
  - Click on the image -> to learn more.

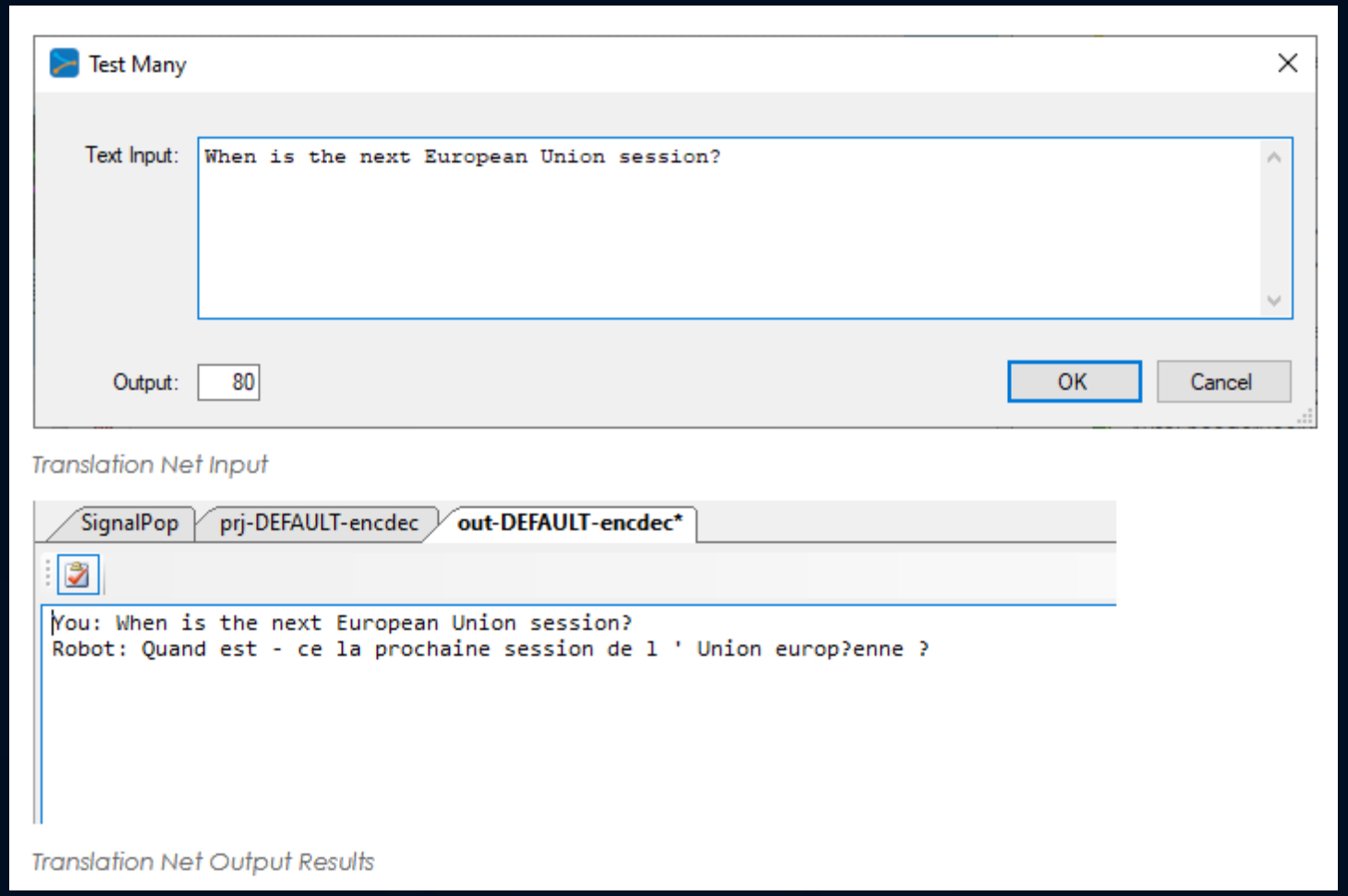
```
You: O God! O God!

Robot: hath men are wise friends,
Becomes for him, we thing have stands to this brother's
To do my blanchings and so my father's
Before my perish, thy possite and seems depart.

HERRY BOLINGBROKE:
Thence two some a suffer, we my circuptanly:
And what will they have no farthy too.

PRINCE EDWARD:
O, I hope some these swords, still me, they would
With that do me to the service?

BUCKINGHAM:
No, that, ha, and they married, at my drums
Is not my fortune world too too:
They my father word,--look their princess!
And how, madam, for thee will never by,
Her and their courageous whiper of him.
```

https://www.signalpop.com/2022/11/23/gpt-in-mycaffe-is-here/

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Language Translation**
  - Using an Encoder/Decoder transformer model, MyCaffe translates English to French.
  - Click on the image -> to learn more.

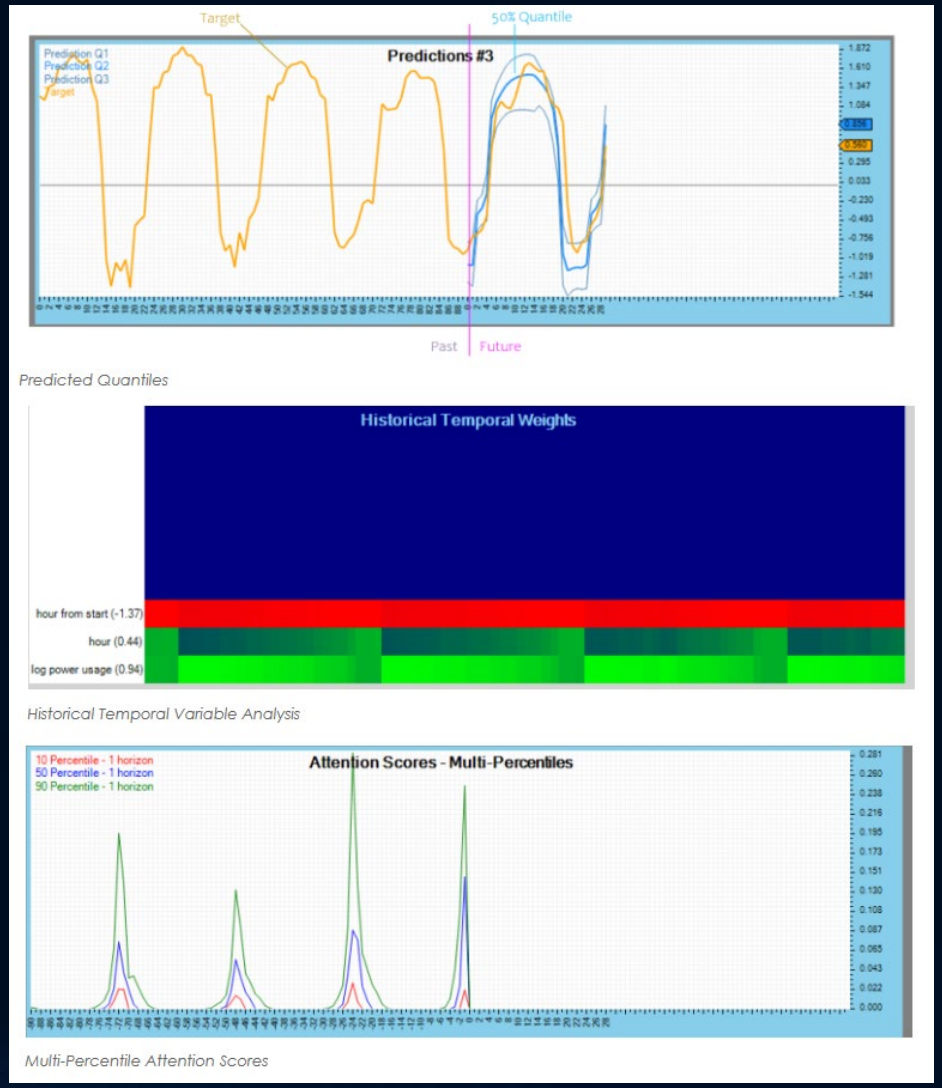


https://www.signalpop.com/2023/02/22/chatgpt-architecture-now-supported-with-encoder-decoder-transformer-models-using-cuda-11-8-and-cudnn-8-8/

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Time Series Prediction**
  - Using a Temporal Fusion Transformer Model, MyCaffe predicts **energy use and traffic flows**.
  - Click on the image -> to learn more.

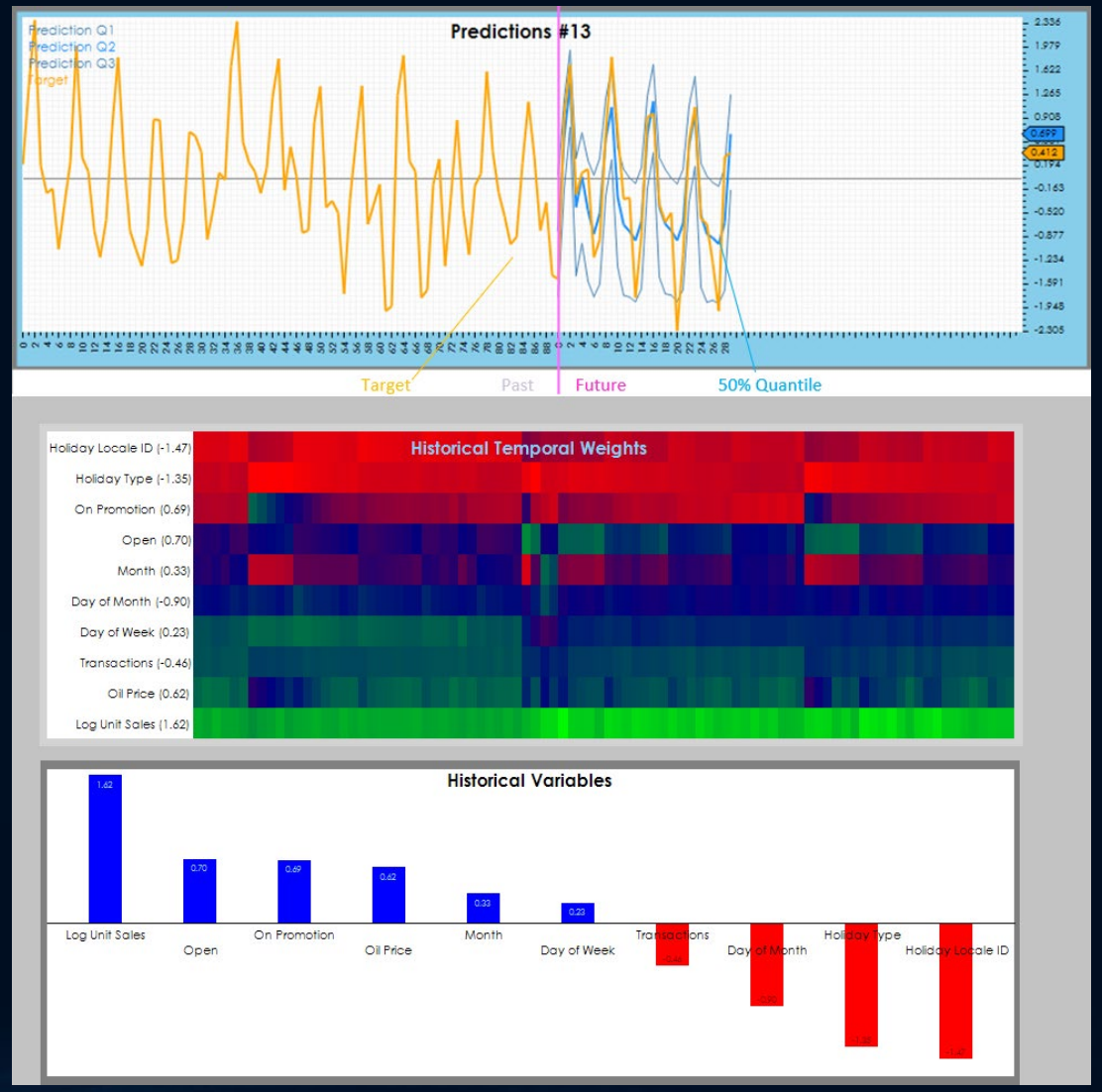


https://www.signalpop.com/2023/06/09/tft/

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Time Series Prediction**
  - Using a Temporal Fusion Transformer Model, MyCaffe predicts **retail demand flows**.
  - Click on the image -> to learn more.



https://www.signalpop.com/tutorial-create-and-train-a-temporal-fusion-transformer-to-predict-retail-demand-flows

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

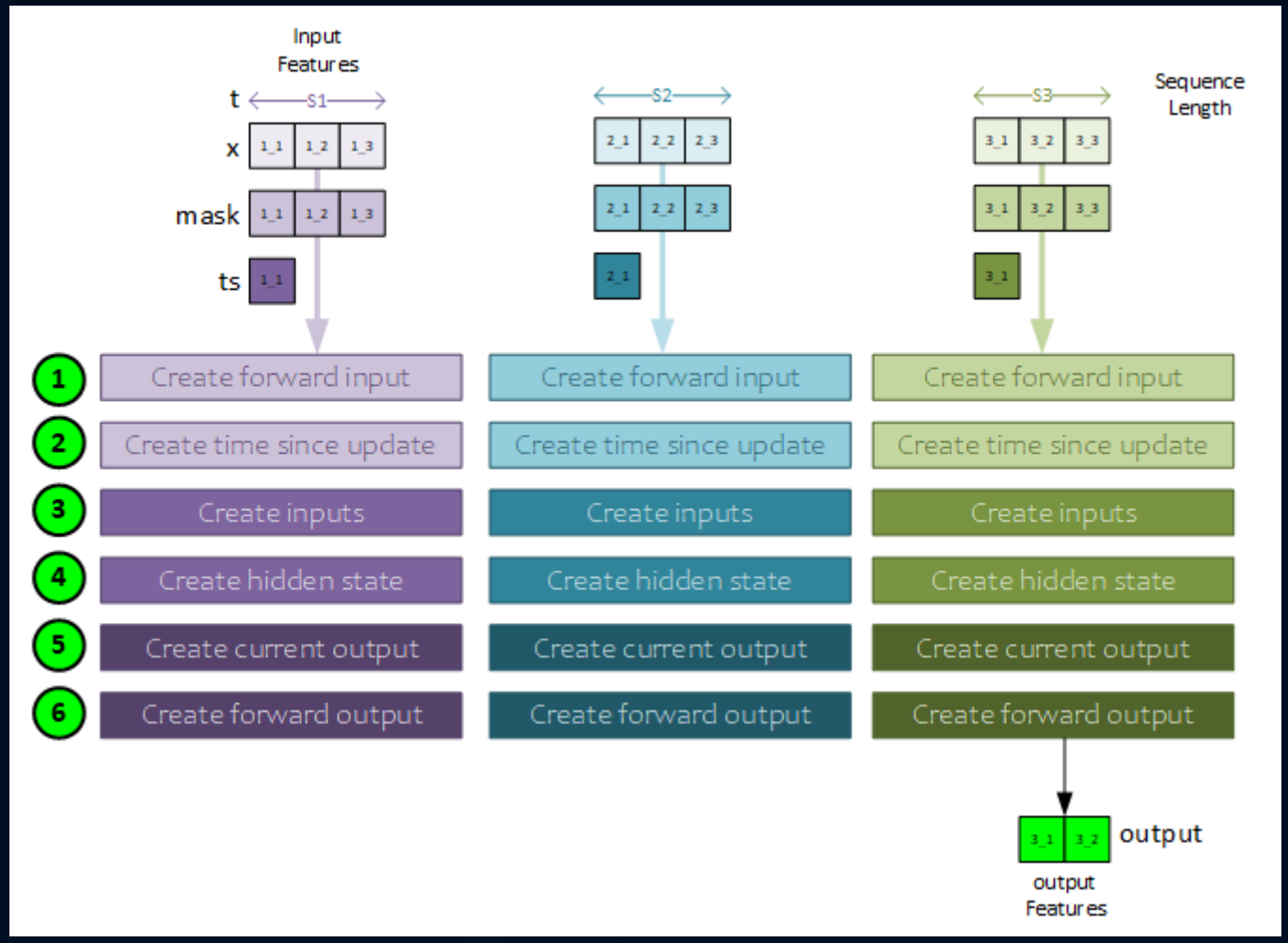
- **Liquid Neural Nets**
  - Using liquid neural nets, MyCaffe shows how the closed-form continuous time compares to the liquid time constant when learning a Sin curve.
  - Click on the image -> to see this in action.

https://www.youtube.com/watch?v=juiX5cFoLOs

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Liquid Neural Nets**
  - Both CfC and LTC type liquid neural nets supported by MyCaffe. To learn more, **Click image ->**
  - New Liquid Neural Net layers in MyCaffe include, **CfcLayer**, **CfcUnitLayer**, and **LtcUnitLayer**. Click links for source code on GitHub.
  - To be showcased in the next MyCaffe release…



https://www.signalpop.com/2023/08/11/closed-form-continuous-time-liquid-neural-net-models-a-programmers-perspective/

© 2023 SignalPop LLC. All rights reserved.

Making AI Work – AI Models and Examples

- **Convolution Models**
  - Using many convolution models running in parallel, MyCaffe automatically trades short-term options profitably.
  - Click on the image -> to see this in action.

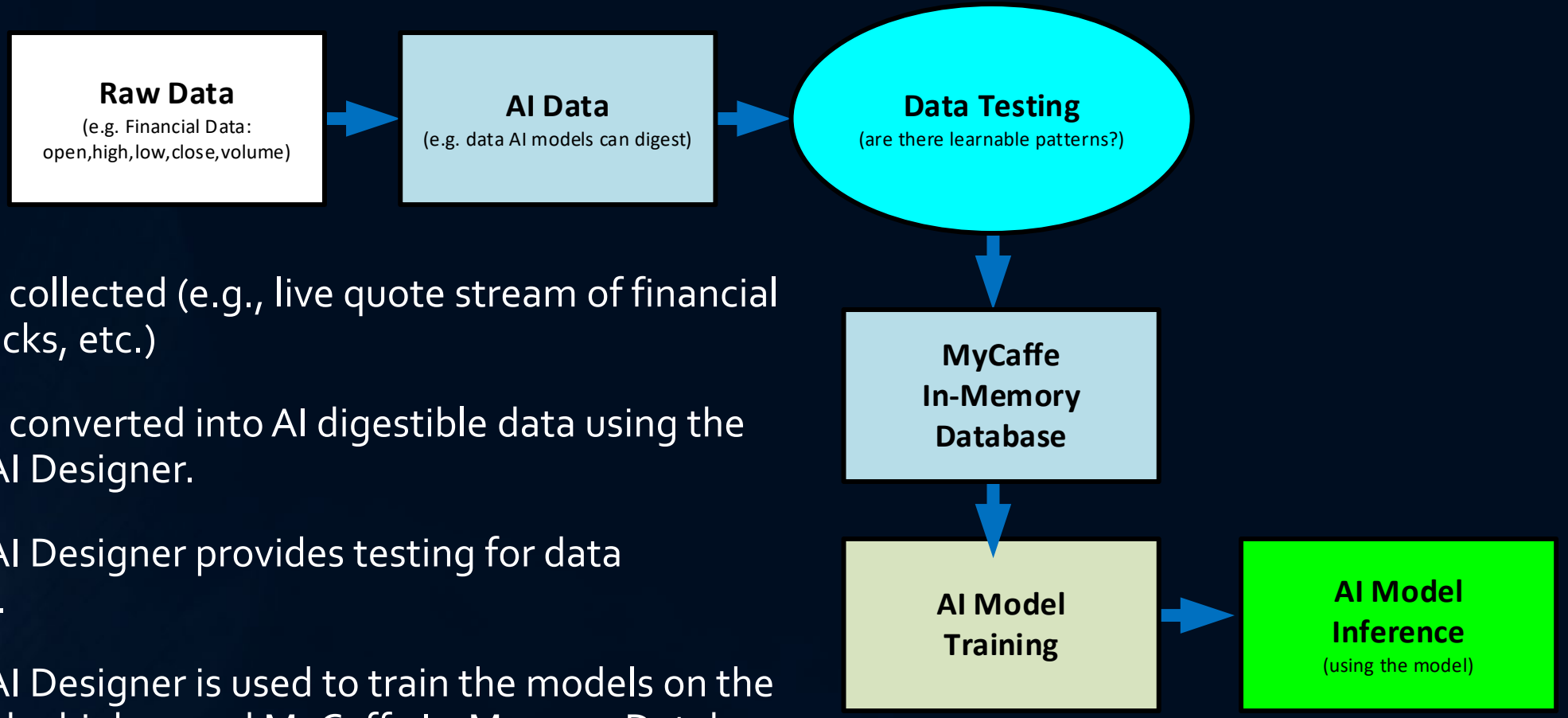
https://www.youtube.com/watch?v=sy_bgyHgRjM

© 2023 SignalPop LLC. All rights reserved.

AI Data Pipeline

FULL STACK ARTIFICIAL INTELLIGENCE

Leverage Your Data – AI Data Pipeline

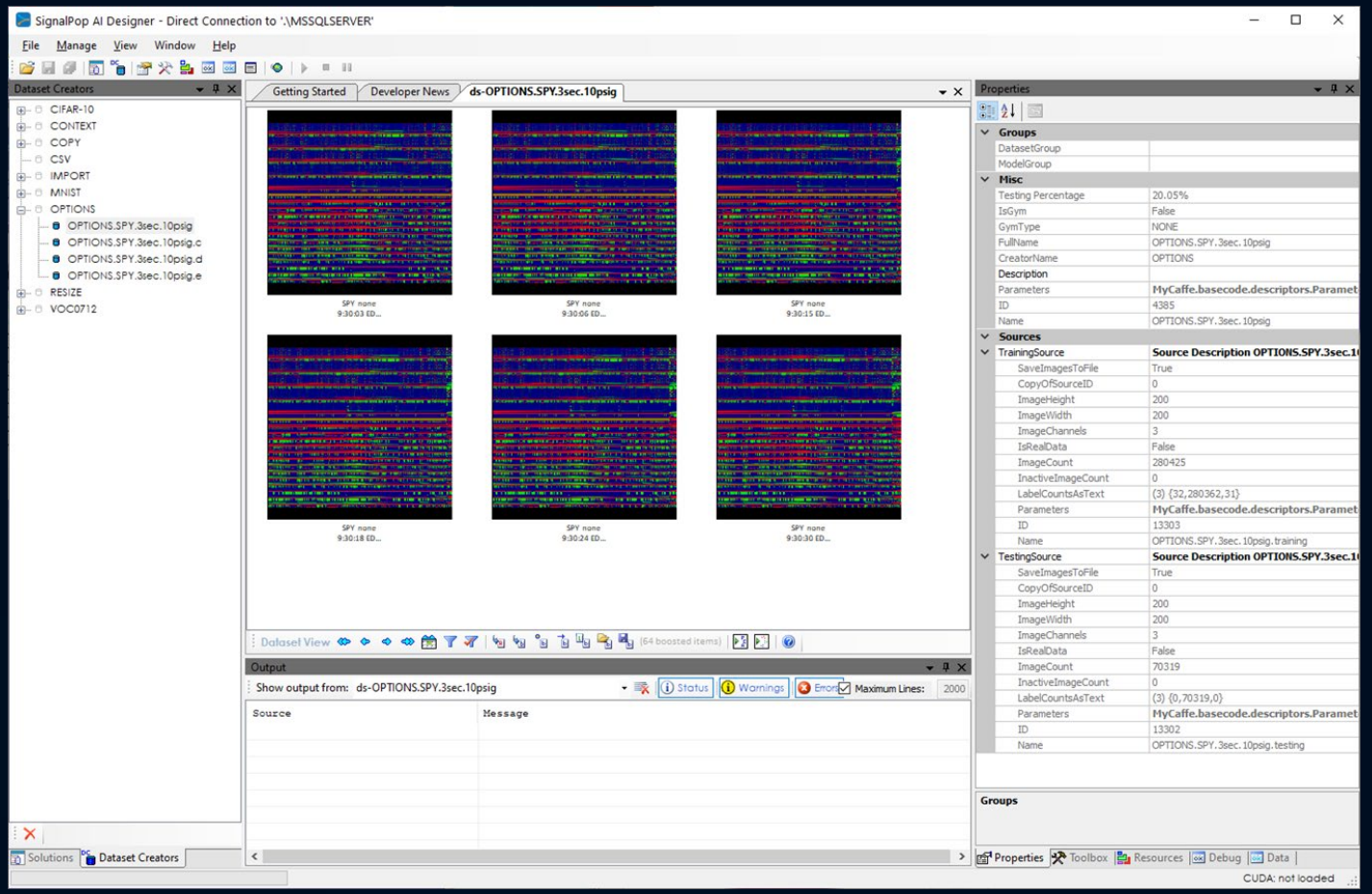


- Raw data is collected (e.g., live quote stream of financial data for stocks, etc.)
- Raw data is converted into AI digestible data using the SignalPop AI Designer.
- SignalPop AI Designer provides testing for data learnability.
- SignalPop AI Designer is used to train the models on the data using the high-speed MyCaffe In-Memory Database.
- MyCaffe AI Platform NuGet integrated into applications to run trained model on formed data in real-time

© 2023 SignalPop LLC. All rights reserved.

Leverage Your Data – AI Data Pipeline – data forming

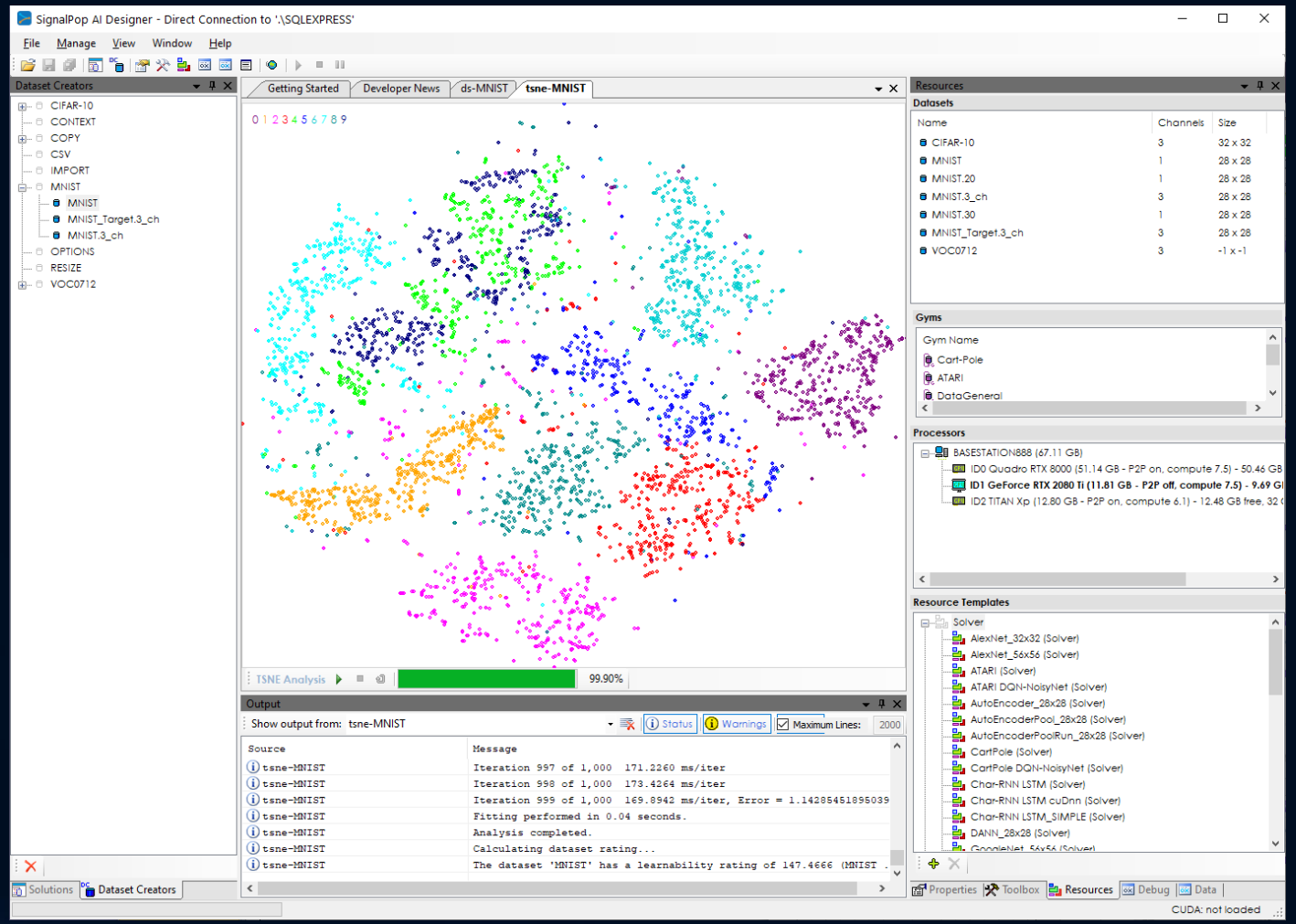
- Raw data is converted into AI digestible data using the SignalPop AI Designer.
- In the example of financial quote streams, the data is transformed into image sets.
- These image sets are later fed into AI models used to detect various inflection points used in decision making.



© 2023 SignalPop LLC. All rights reserved.

Leverage Your Data – AI Data Pipeline – data testing

- The SignalPop AI Designer quickly determines the learnability of data sets using various algorithms such as TSNE and PCA
- These algorithms visually and numerically quantify the learnability of a given data set.



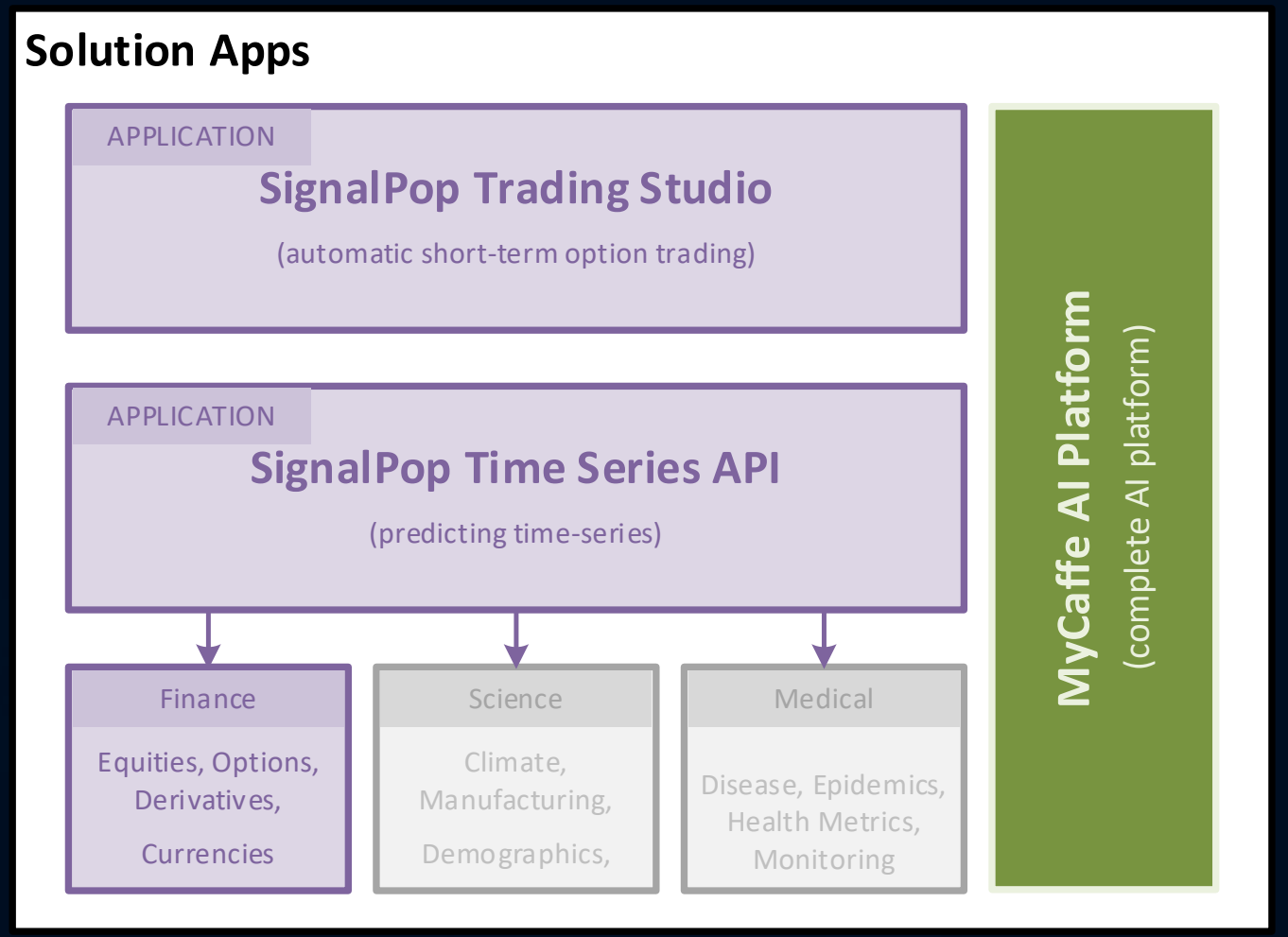
© 2023 SignalPop LLC. All rights reserved.

SignalPop Solution Apps

FULL STACK ARTIFICIAL INTELLIGENCE

Full Stack AI – Solution Apps

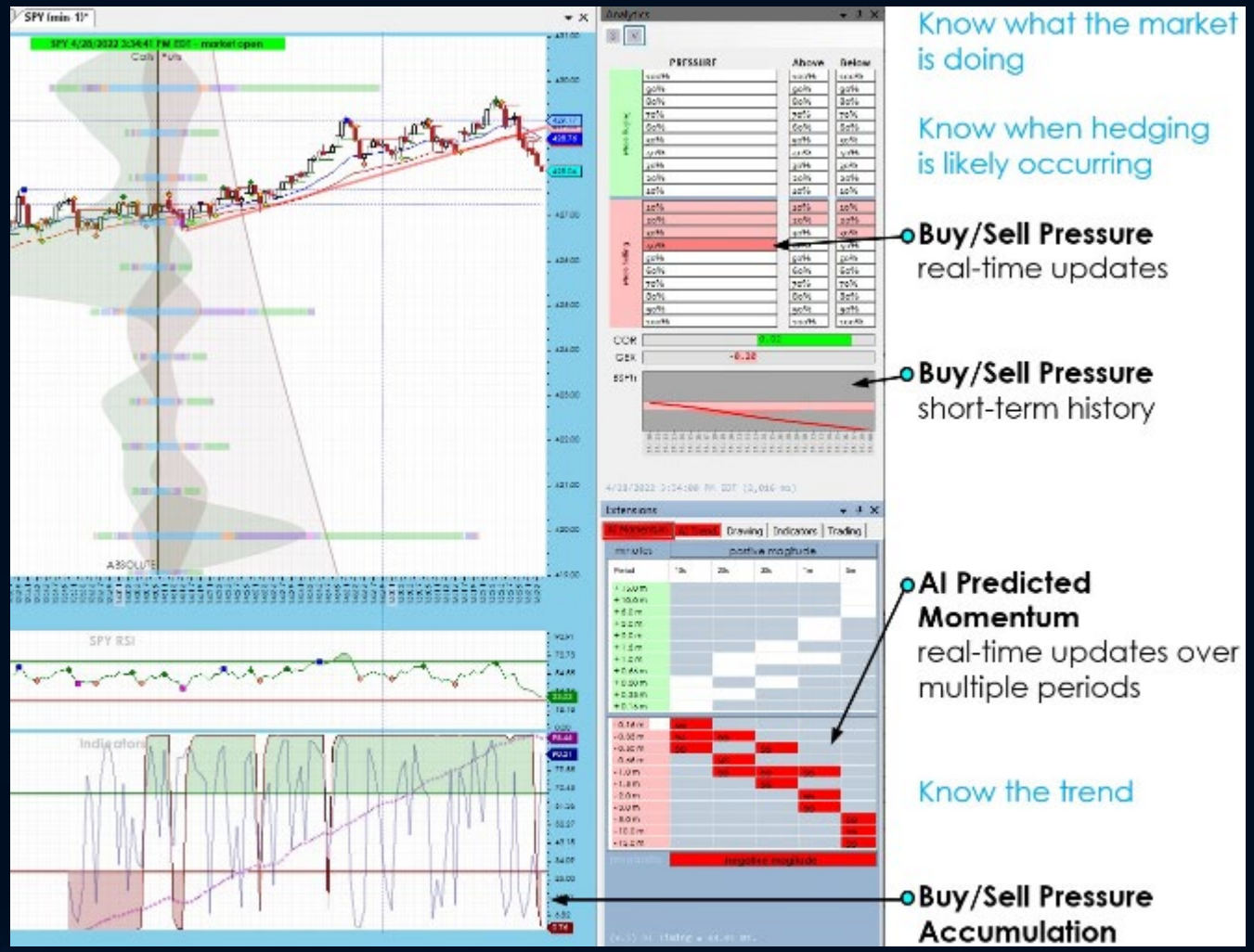
- AI Value captured through applications that solve difficult problems.
- SignalPop Trading Studio is here today…
- SignalPop Time Series API soon…



© 2023 SignalPop LLC. All rights reserved.

Full Stack AI – Solution Apps: SignalPop Trading Studio

- Real-time AI in action – using MyCaffe, the SignalPop Trading Studio processes over 50,000 data points in 100 ms. time periods to predict short-term momentum movements in price.
- In addition, using internal proprietary models, SignalPop processes between 20-70 million quotes daily to automatically trade short-term options profitably.
- To learn more about inferencing in the SignalPop Trading Studio, click on the image ->

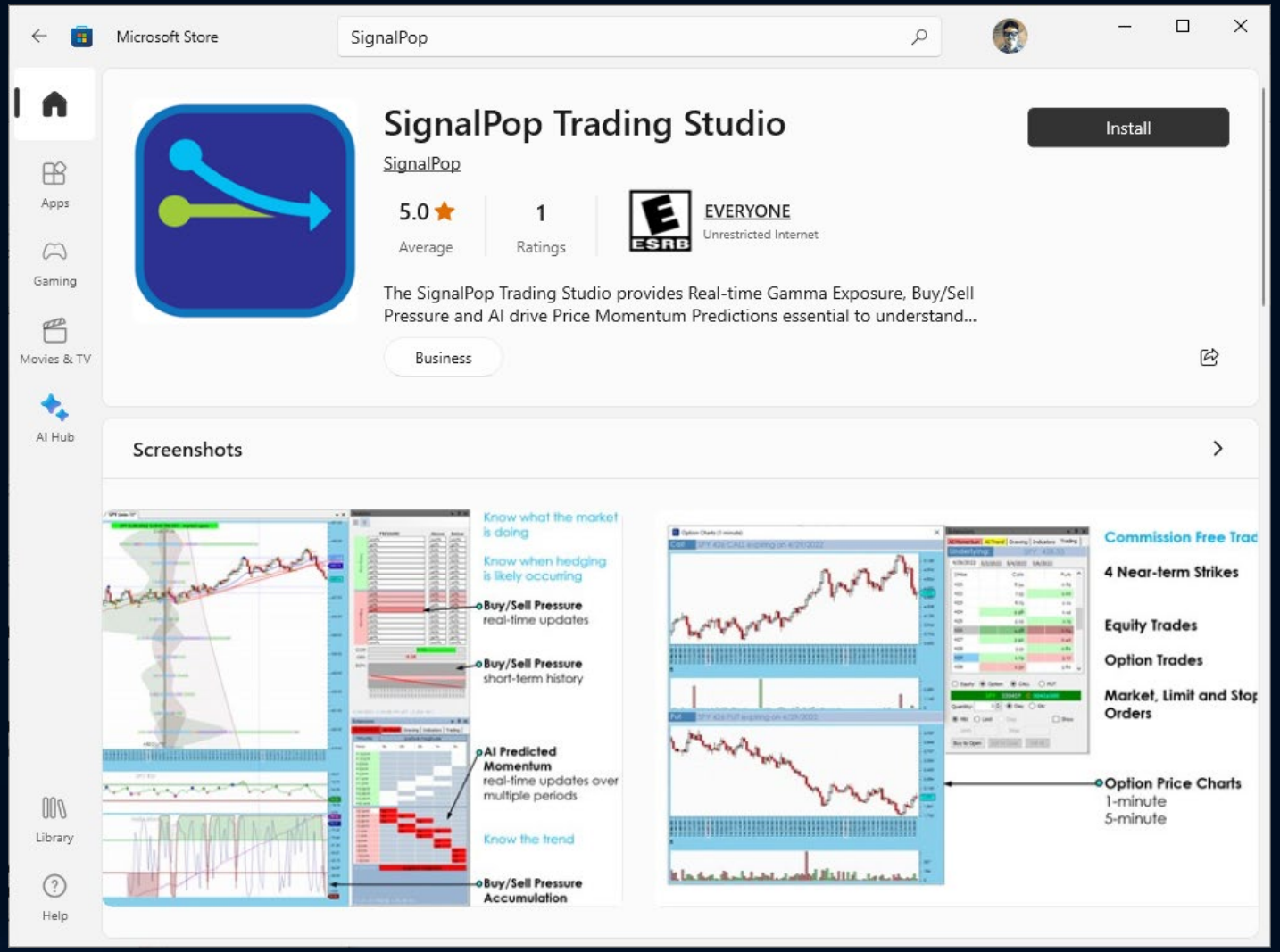


https://www.signalpop.com/2022/07/06/using-mycaffe-ai-platform-in-real-time-inferencing/

© 2023 SignalPop LLC. All rights reserved.

Full Stack AI – Solution Apps: SignalPop Trading Studio

- The SignalPop Trading Studio is available on the Microsoft Store.
- To learn more about the SignalPop Trading Studio, click on the image ->



https://apps.microsoft.com/store/detail/signalpop-trading-studio/9NJJZ9HJQ0L8

© 2023 SignalPop LLC. All rights reserved.

Thank You!

DAVE BROWN - DAVEB@SIGNALPOP.COM

STEVE BROWN - BROWN2020@GMAIL.COM