

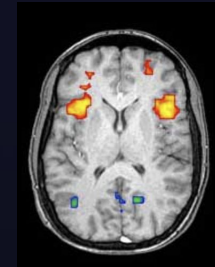
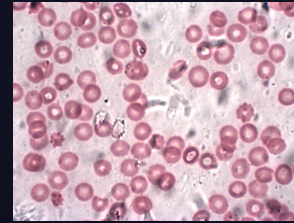
Visualizing ONNX models' internal data: Key things to look for



Mina Amiri, Senior Data Scientist

Open the AI black box

Microscope, telescope and brain imaging techniques opened a new way to look at complex systems



Free Zetane Viewer

Model architecture and tensors



More info and tutorial:

github.com/zetane/viewer

zetane.com/gallery

Opening the AI Black Box

Microscopes, telescopes and brain imaging techniques opened new ways to look at complex systems. The Zetane Viewer offers a unique approach to understand and accelerate discovery in machine learning and artificial neural networks.



- Easily open the AI Black box
- Visualize and understand all the model's components
- Inspect the model's architecture and internal tensors
- Study the tensor values distribution
- Gain insight about the model's performance
- Discover your next model optimization without guesswork

Download Zetane Viewer
for Windows

Supports ZTN and ONNX files

Download Zetane Viewer
for Linux

Supports ZTN and ONNX files

Download Zetane Viewer
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Supports ZTN and ONNX files

Looking for Zetane Pro? [Get Started Here!](#)

Zetane Gallery

Using the free Zetane Viewer, you can open and visually inspect curated models (ZTN files) from the Zetane Gallery below. Just launch the Zetane viewer and load a model using the top left button.

You can also load most ONNX model files (YOLOv4 and BERT-Squad are not yet supported). ONNX is an open standard for machine learning interoperability and there are many models in the [ONNX Model Zoo](#) which can be inspected in the Zetane Viewer.

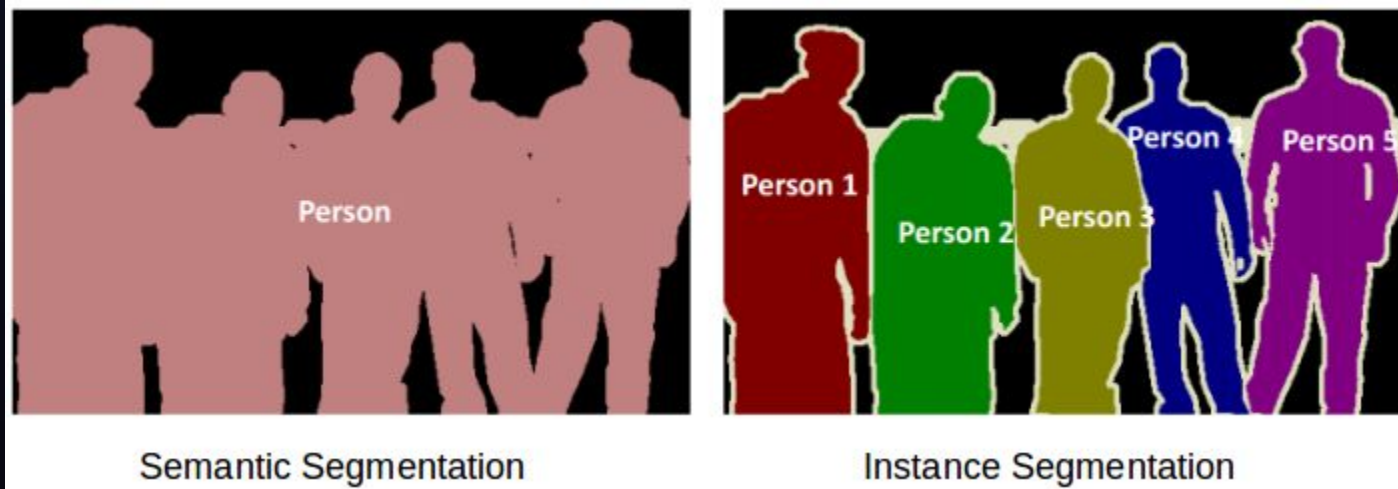
Visualization aspects

- 1) Data
- 2) Network architecture
- 3) Internal tensor inspection



Segmentation

To assign a label to each individual pixel



How to evaluate segmentation?

- Pixel accuracy
- Jaccard Index (intersection over union)

$$|A \cap B| / |A \cup B|$$

A: Ground truth mask
B: Segmented mask

- Dice Index

$$2|A \cap B| / |A| + |B|$$

1) Data

- ❖ Is the correct data fed to the network?
- ❖ Is the shape of the data correct?
- ❖ Have you normalized your data correctly?

Visual Insight I

Lung X-ray segmentation

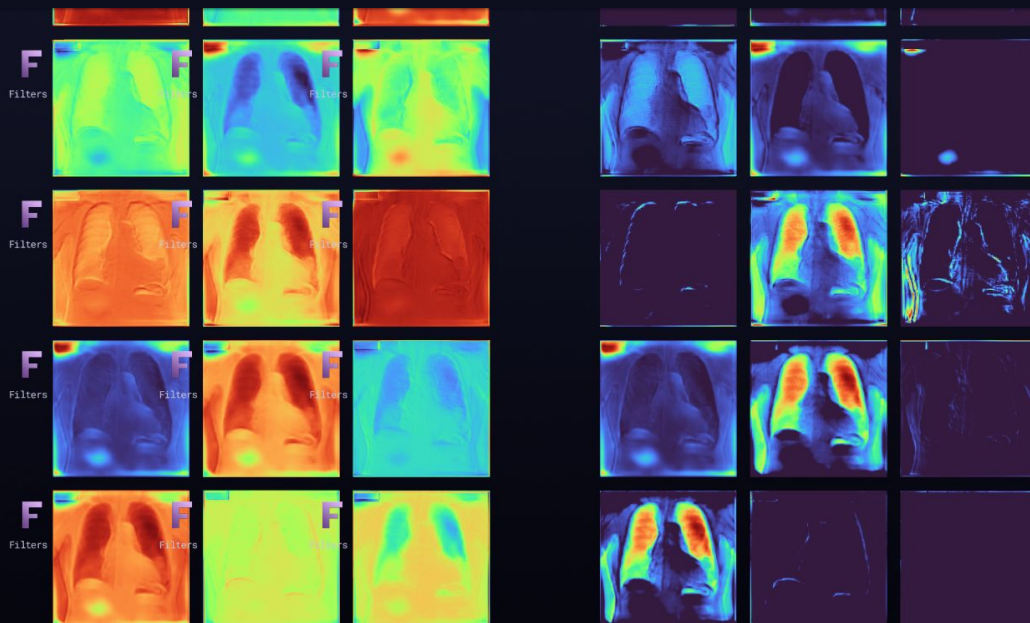


Problem: How to improve

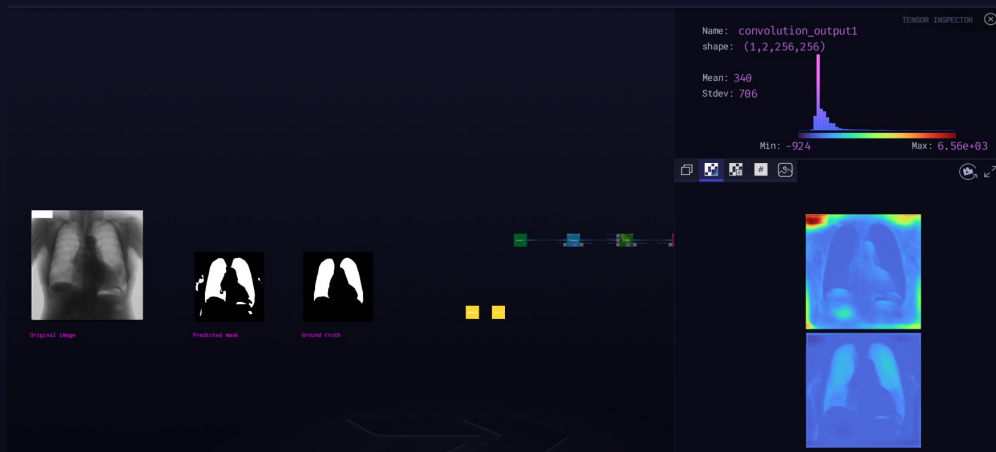
Usual way: Satisfied!

Visual way: Model attention
to patient tag

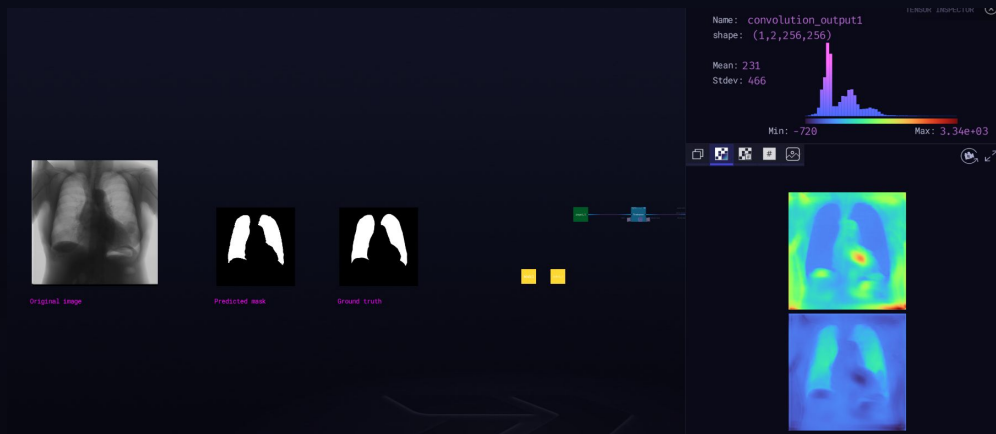
Solution: Cleaning the data



Average Dice: 0.97



Average Dice: 0.98



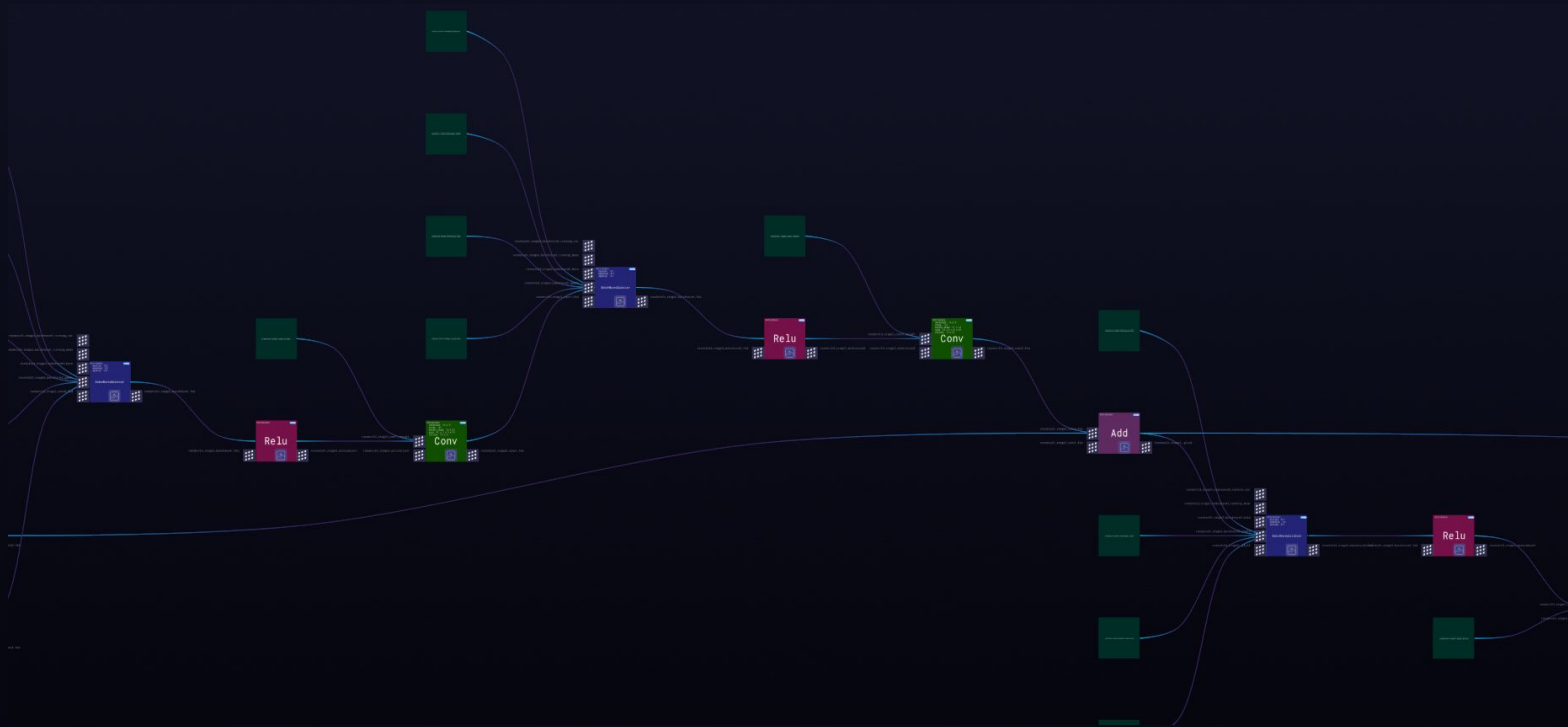
2) Network architecture

- ❖ Are all layers connected correctly?
- ❖ Copy-paste issues!
- ❖ Skip-connection, activation functions, batch normalization, concatenation, etc

Overall structure



Zoom



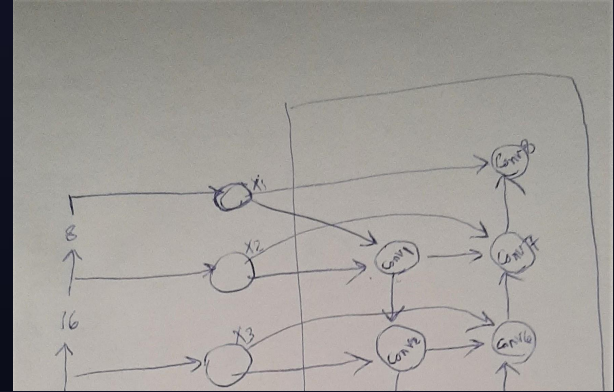
Even more zoom



Visual Insight II

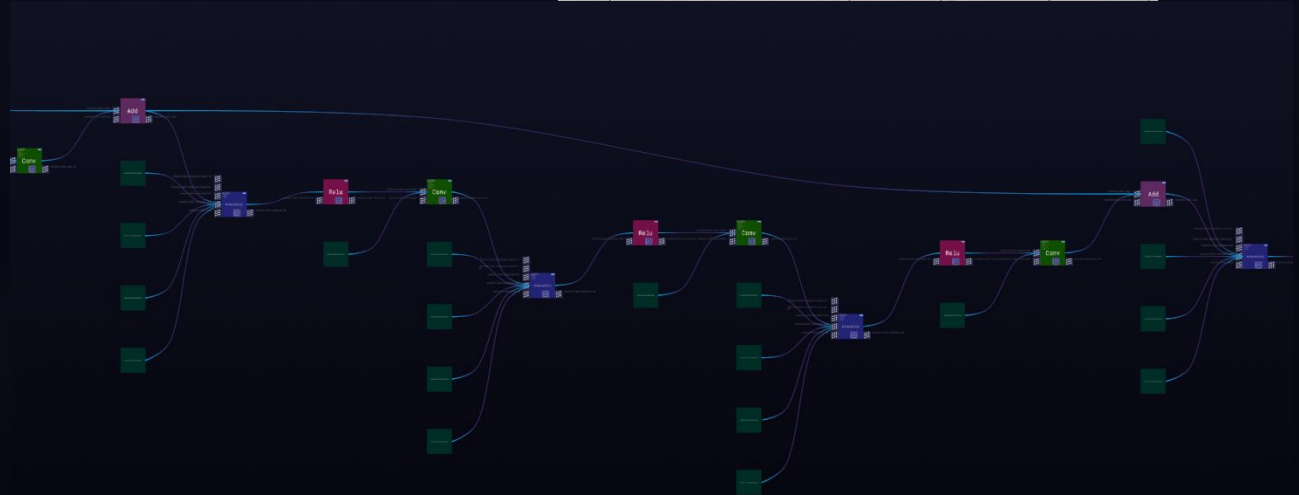
Problem: Verifying network architecture design

Usual way:



Visual way:

Solution: Confidence
in design



3) Internal tensor inspection

- ❖ Feature maps, filters, bias, input/output
- ❖ Histogram, parameter range
- ❖ Shape and number of tensors



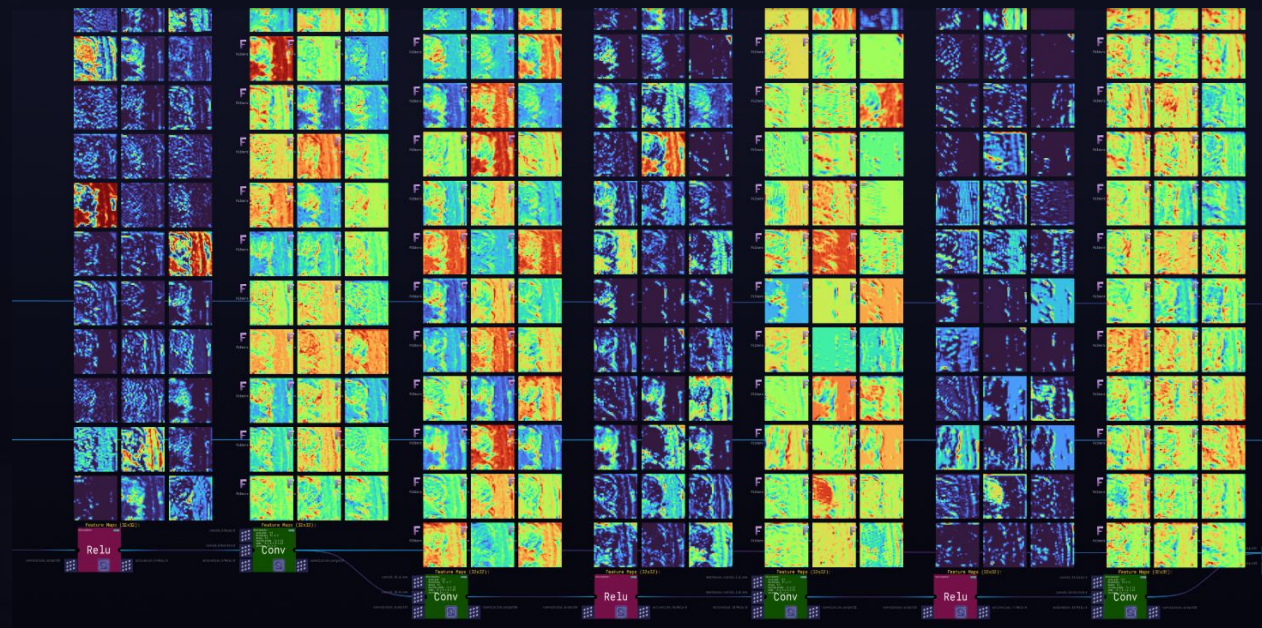
Visual Insight III

Problem: Dead neurons

Usual way: Unknown issue or Write code

Visual way:

Solution: Batch norm, Activation function (e.g. leaky Relu)



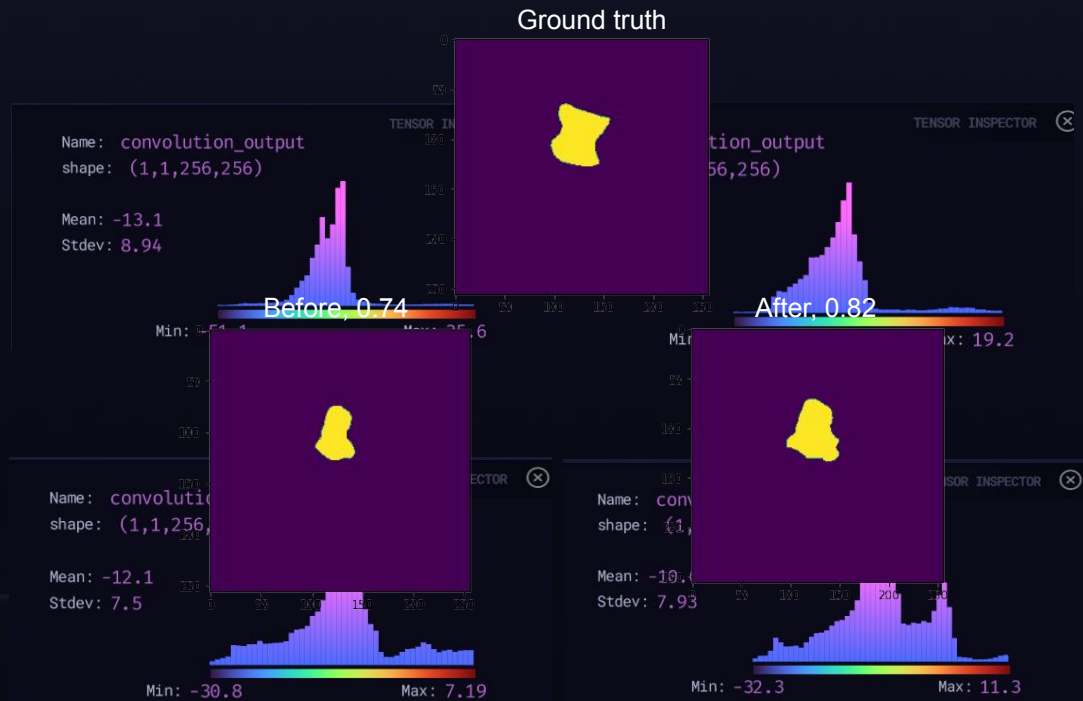
Visual Insight IV

Problem: Weak segmentation

Usual way: Error analysis

Visual way:

Solution: Adaptive thresholding



Thank you very much!

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To learn more:

github.com/zetane/viewer