

# “AI at the Edge”

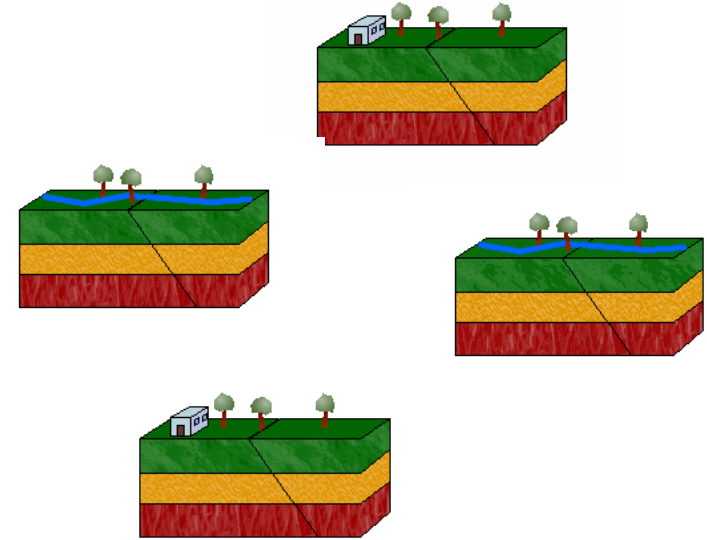
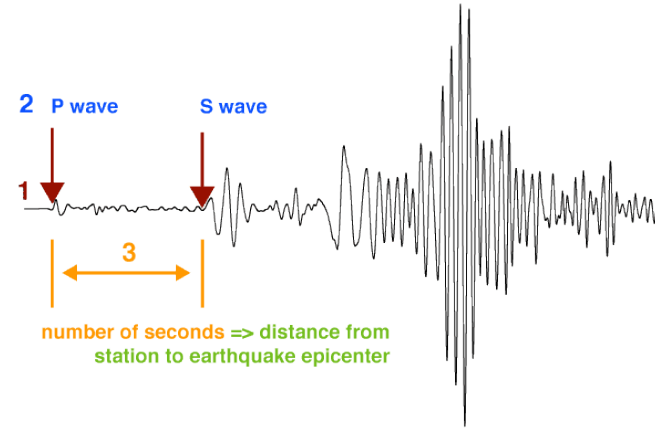
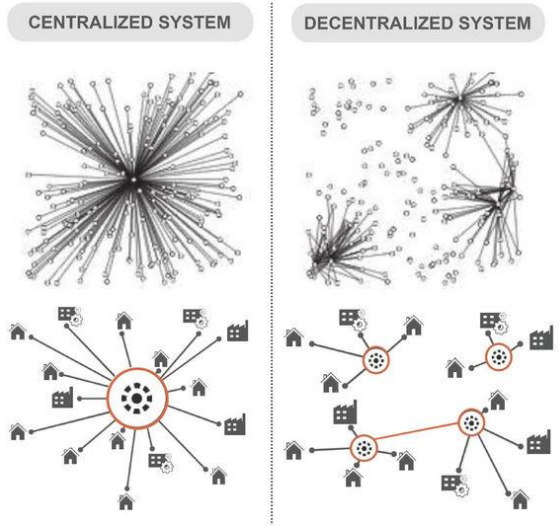
## Accelerating Earthquake Detection with Deep Learning and Generative Adversarial Networks

Weijith Manula Wimalasiri

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# What is Earthquake Detection and Why Does It Matter?



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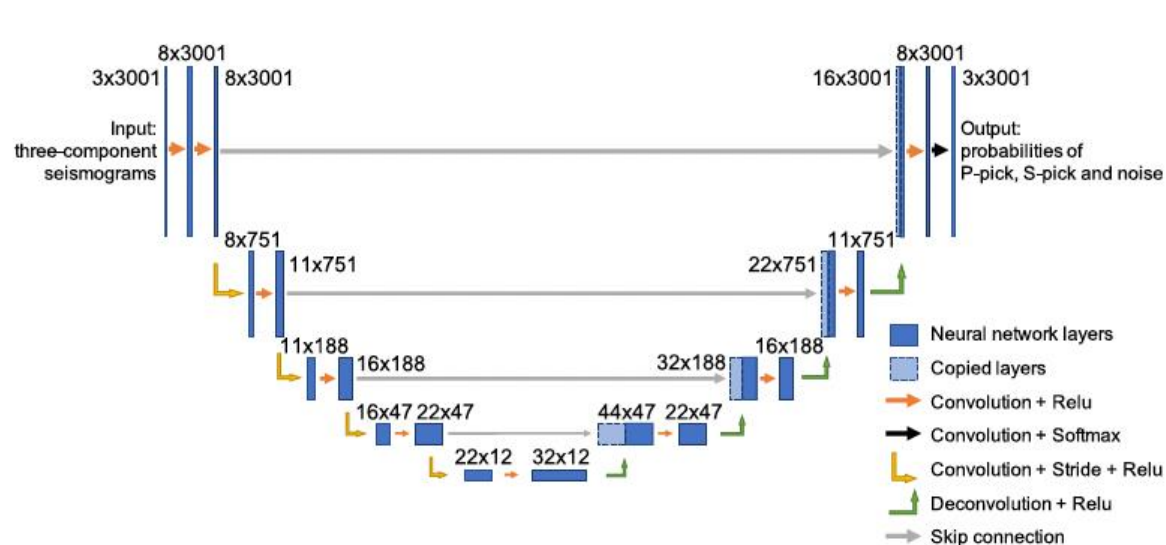


# Adapting PhaseNet for Real-Time Earthquake Detection

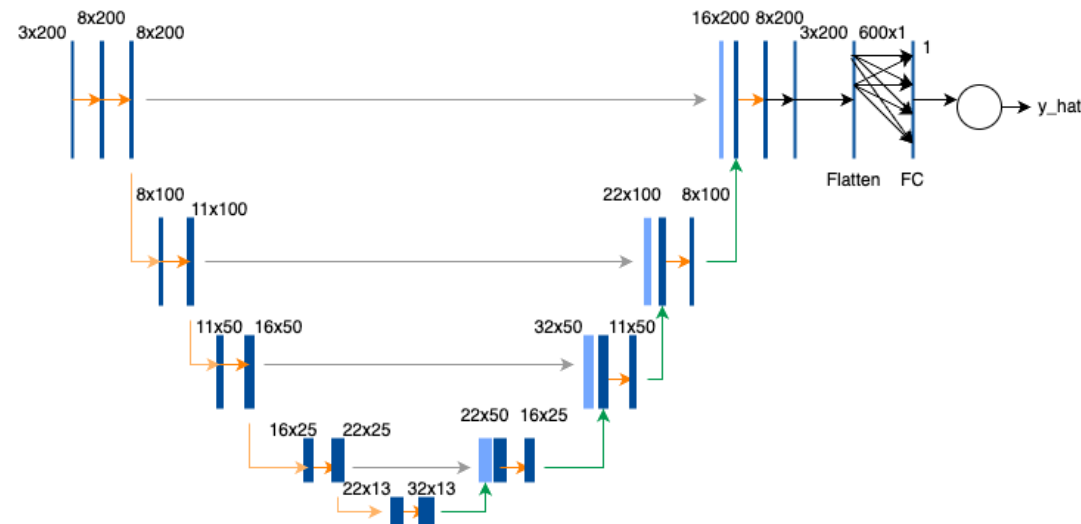
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# Limitation of Current PhaseNet Architecture:



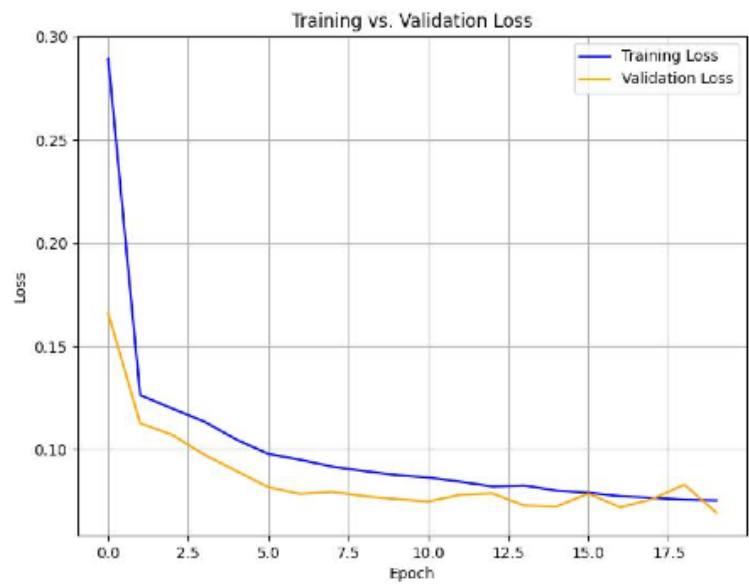
Unet Architecture of PhaseNet



Adapted PhaseNet Architecture  
for smaller windows

- 10s vs 30s window size
- Seismic Picking vs Detection

# Results



Accuracy: 97.0816%

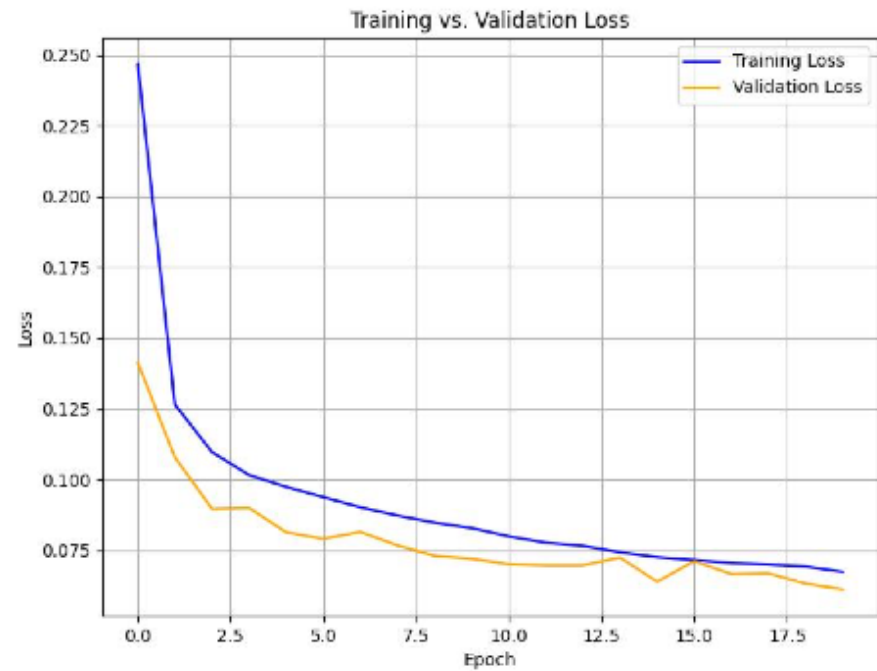
Precision: 98.6072%

Recall: 95.5454%

F1 Score: 97.0522%

Parameters: 17003

Evaluation Indicator	Phase	PhaseNet
Precision	P	0.939
	S	0.853
Recall	P	0.857
	S	0.755
F1 score	P	0.896
	S	0.801
$\mu(\Delta t)(ms)$	P	2.068
	S	3.311
$\sigma(\Delta t)(ms)$	P	51.530
	S	82.858



Accuracy: 97.3520%

Precision: 98.3230%

Recall: 96.3775%

F1 Score: 97.3405%

Parameters: 17003



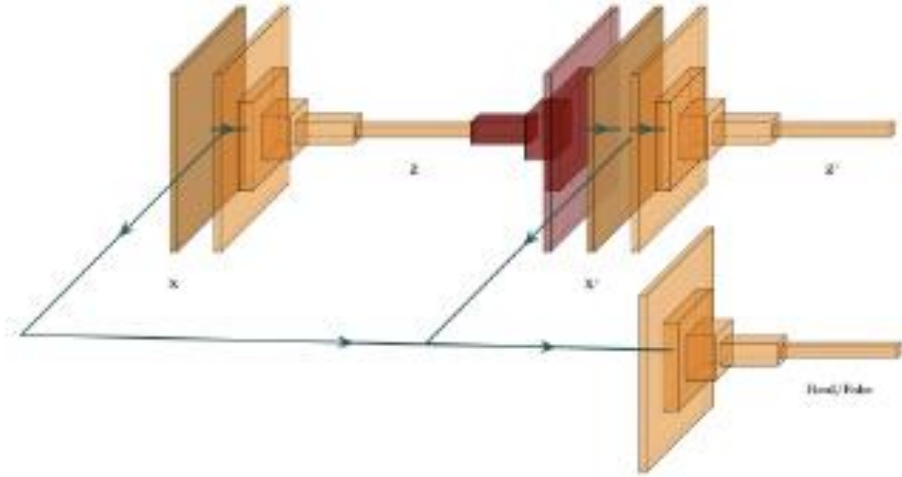
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# QuakeGen: A Semi-Supervised Generative AI Approach for Anomaly-Based Earthquake Detection

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# Proposed WGANomaly Architecture



- High Reconstruction errors  $\rightarrow$  Earthquake (Anomaly)
- Low Reconstruction errors  $\rightarrow$  Noise/Nonearthquake signal

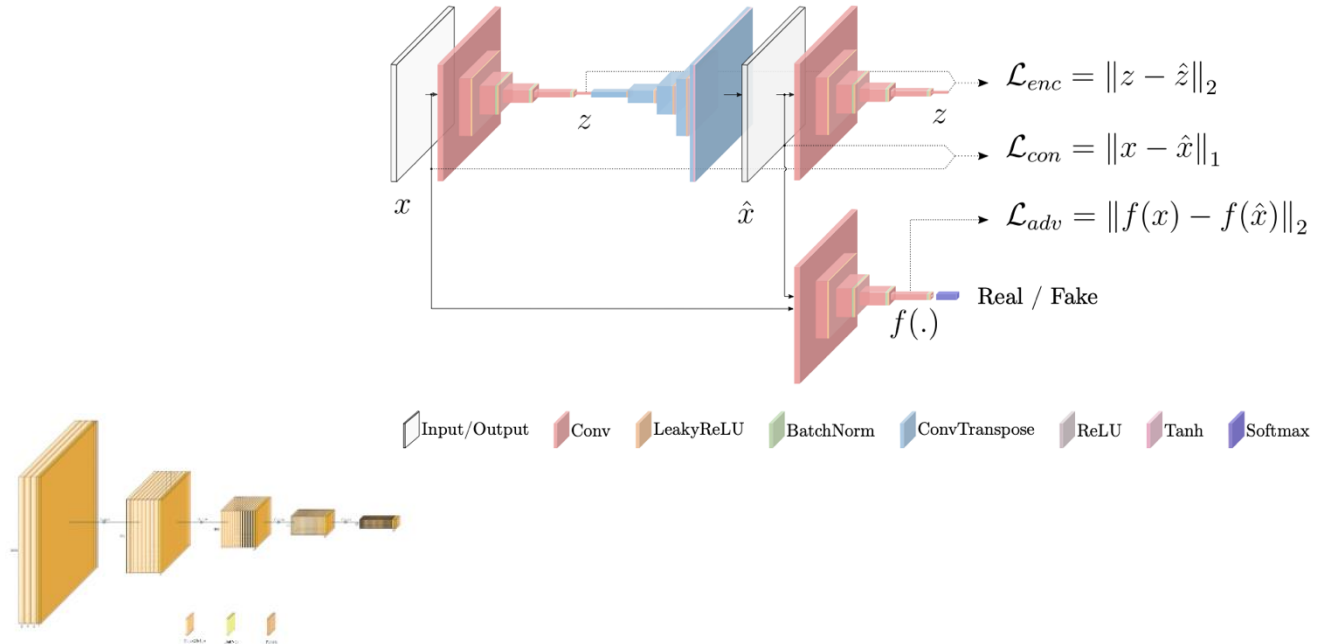


Fig. 3. Encoder Network using WaveGAN [15]

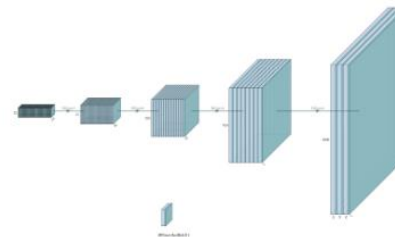
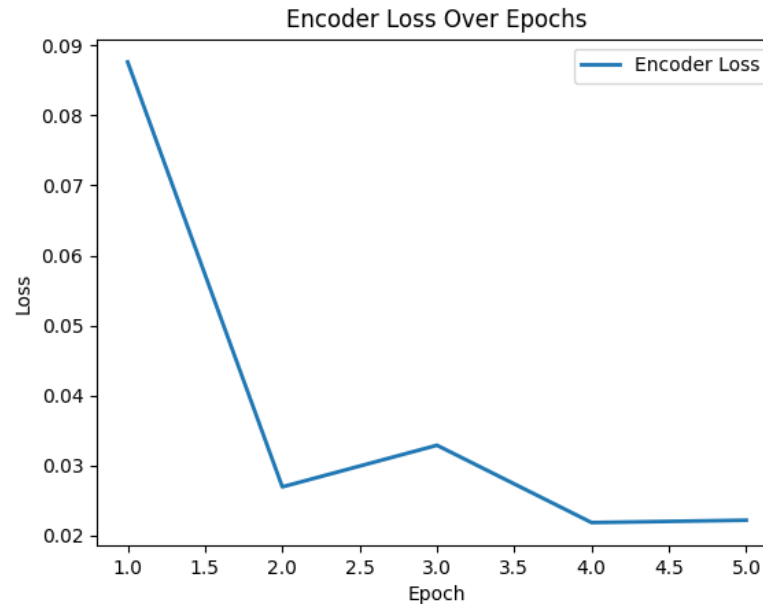
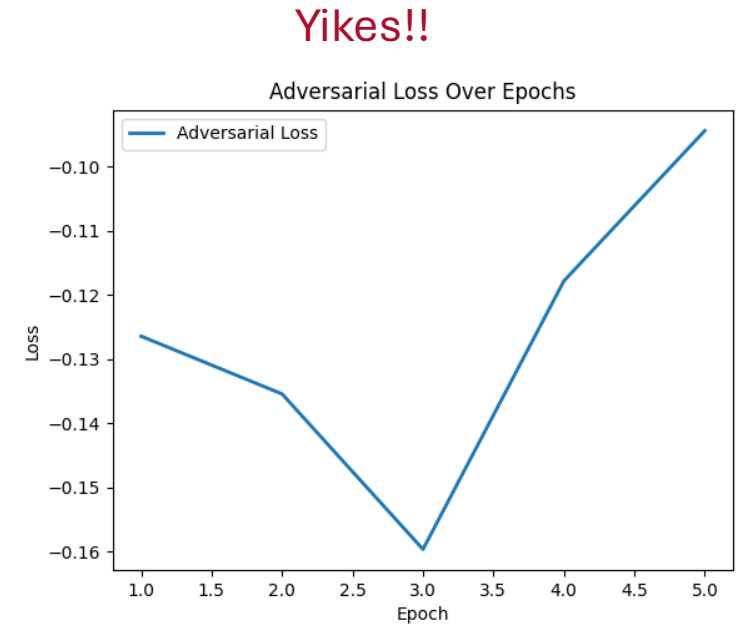
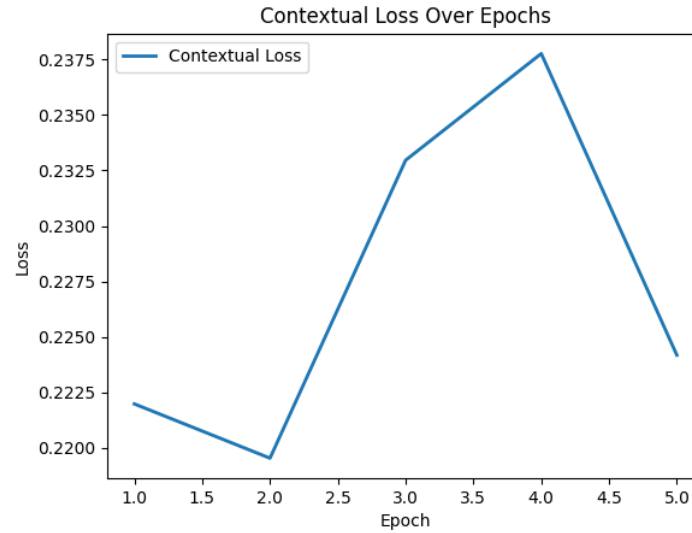
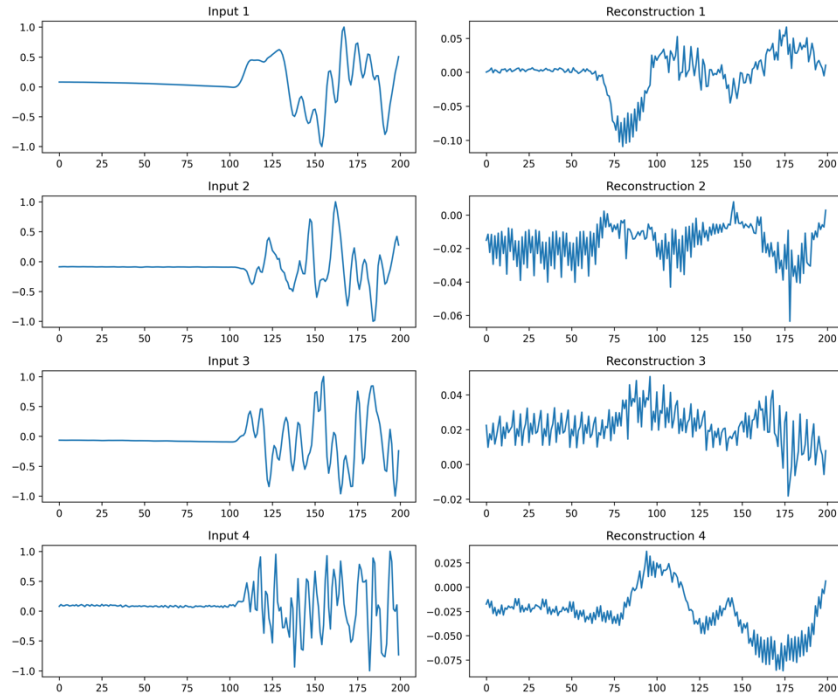


Fig. 4. Decoder Network using WaveGAN [15]



# Results:



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# Conclusion

## Next steps:

- Test the Adapted PhaseNet architecture with real time data on RaspberryShake.
- Further modify QuakeGen to improve it's performance.

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YOU!

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