

VIDEO2RF



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Generative Adversarial Network (GAN) for
Human Activity Recognition (HAR)

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Summary

Development of Pix2Pix GAN and Create GAN-Based RADAR Dataset for Human Activity Recognition

Context

Utilization of Two Different Datasets, i.e. Real RADAR Dataset and Synthesized RADAR Dataset of Various Human Activities, for the Generation of Improved RADAR Dataset using Pix2Pix GAN.

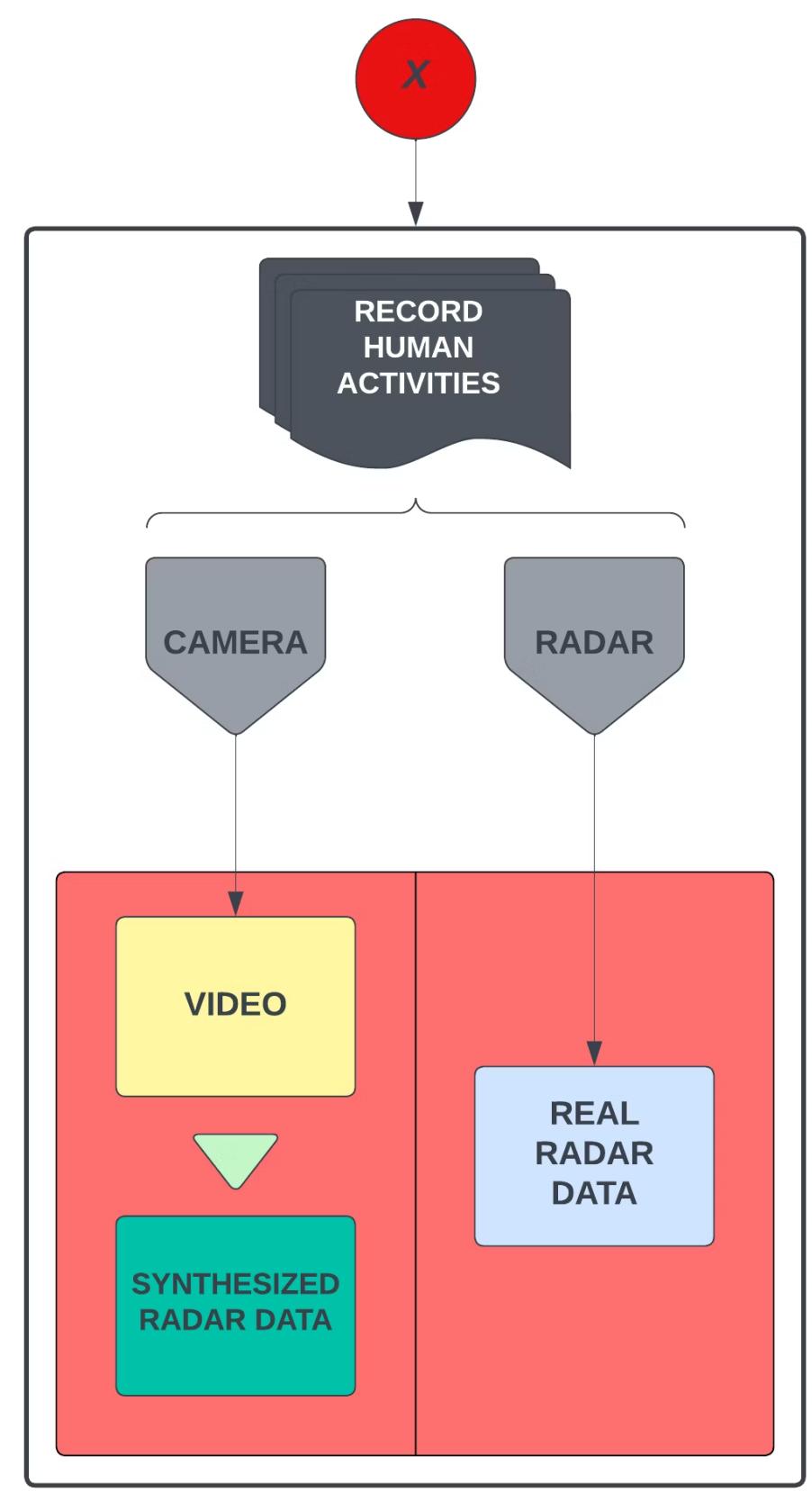
Further, utilizing the GAN-Based RADAR Dataset for Human Activity Recognition System.

Scope/Limitations

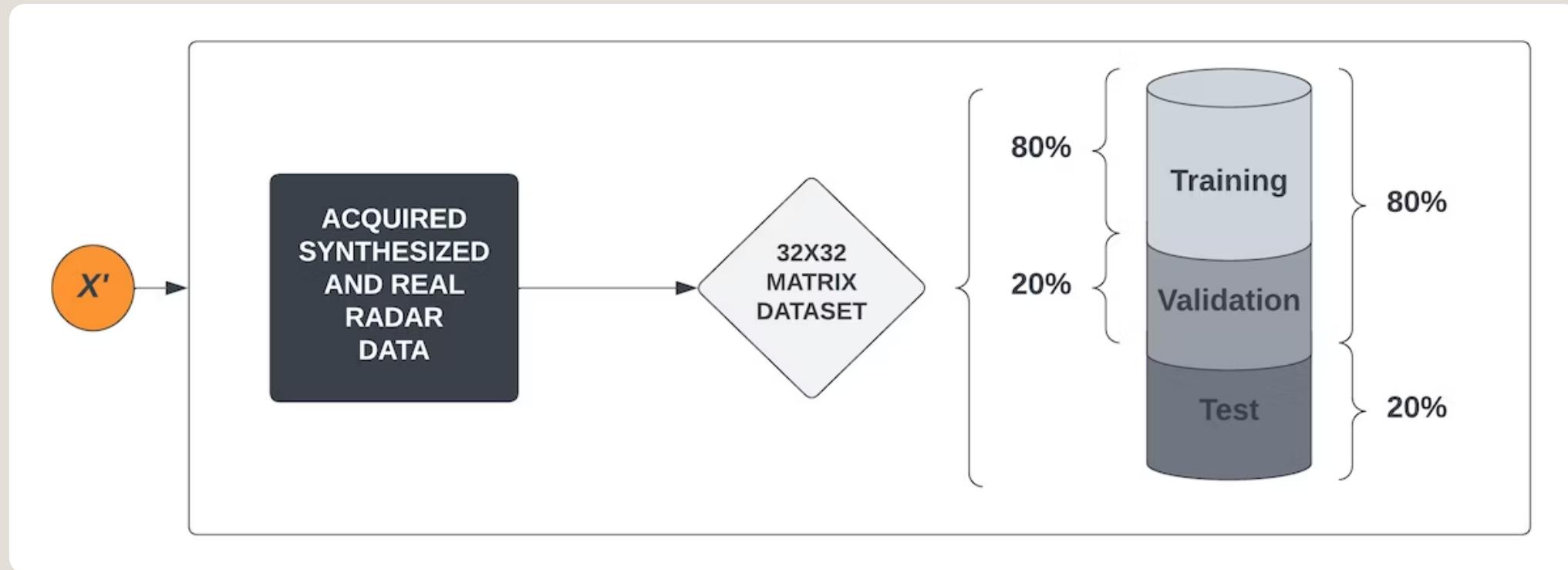
Poor Performance of GAN and Unable to Create High-Quality RADAR Output

Overview

- Capture Human Activities
 - Jumping
 - Running
 - Squats
- Parallel Device Capturing
 - Camera Output: Video
 - RADAR Output: Real RADAR Data
- Output Processing
 - Raw Video to Synthesized RADAR Data
- What Do You Acquire from **X**?
 - Two Types of Datasets
 - Synthesized RADAR Dataset
 - Real RADAR Dataset



Overview



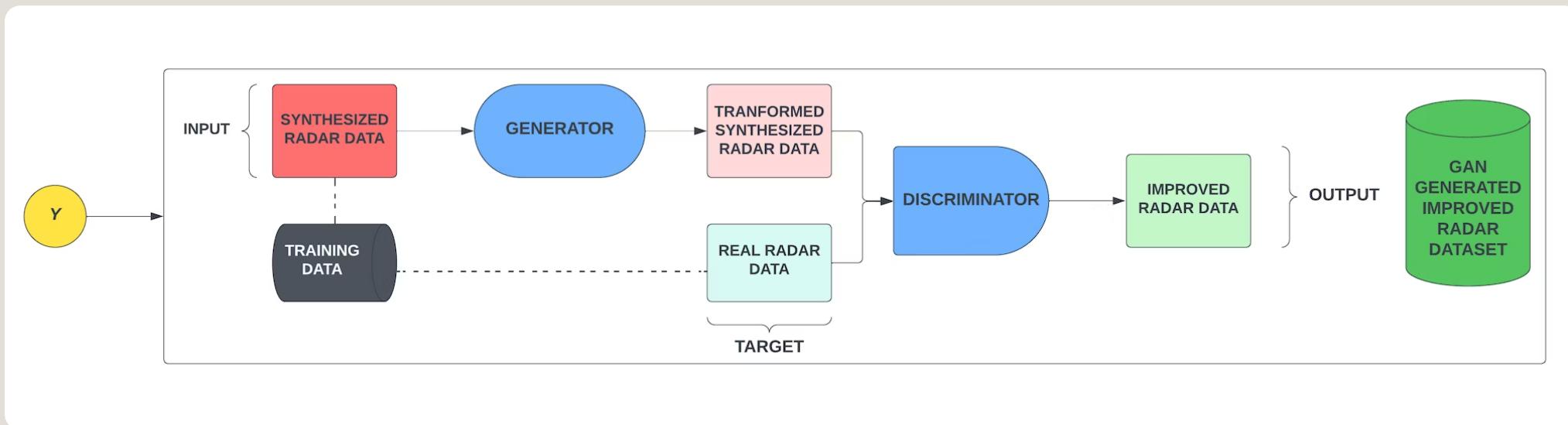
Processing of Acquired Synthesized RADAR Data and Real RADAR Data

Convert the Acquired Data to GAN-friendly 32x32 Matrix Dataset for Real RADAR and Synthesized RADAR Data

Label and Segregate the Matrix Dataset Into Training, Validation and Testing

What Do You Acquire from X' ? Creation of GAN-friendly Dataset for Training Pix2Pix GAN Model

Context



Pix2Pix GAN will Utilize Inputs: Synthesized and Real RADAR Dataset

Generator: Transforms the Synthesized RADAR Data

Discriminator: Checks the Loss Between Two RADAR Data

Pix2PixOutput: Improved RADAR Data

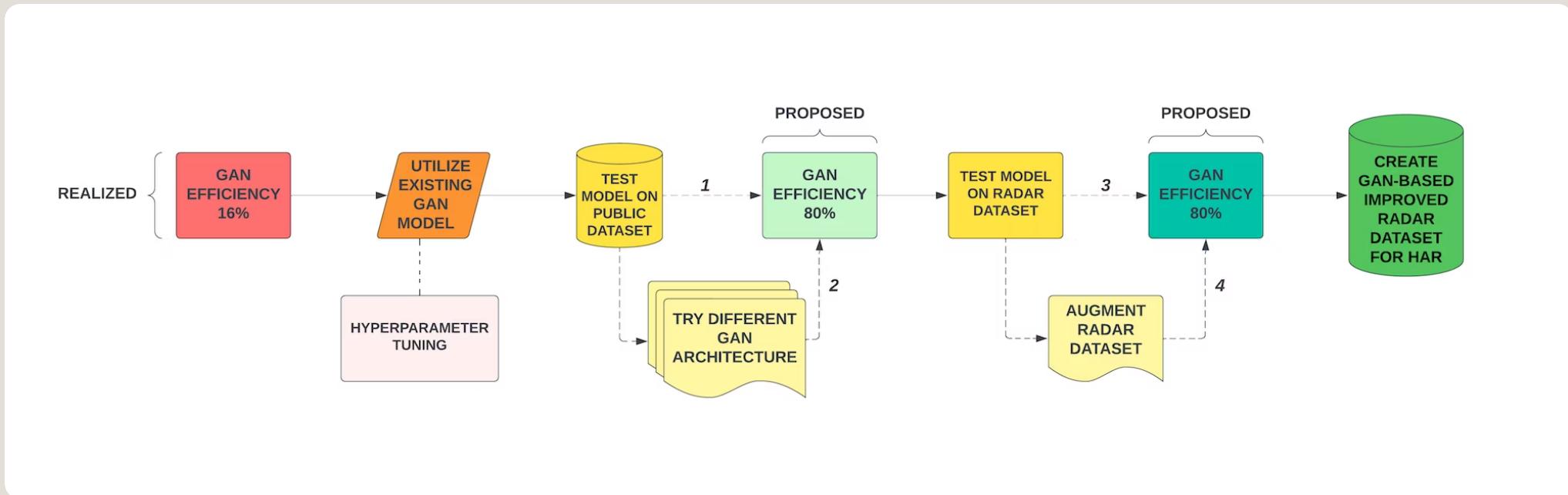
What Do You Acquire from Y ? Pix2Pix GAN Development, Generate Improved RADAR Data and Create a GAN-Based Dataset for Training Human Activity Recognition Model

Goal



Utilise the GAN Generated RADAR Dataset for Training and Development of CNN-Based Human Activity Recognition Model

Approach



Realised Efficiency of GAN ~ 16%

Proposed Efficiency of GAN ~ 80%

3 - If 80% Efficiency's Achieved, Test the Model on the RADAR Dataset

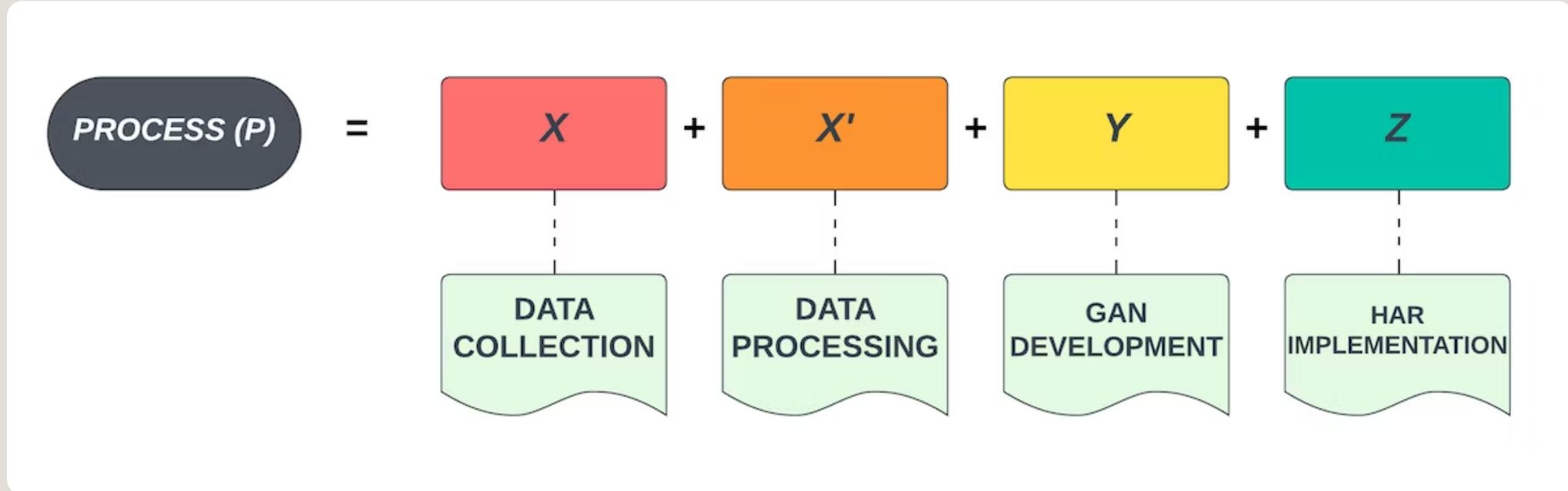
4 - Else, Augment the Existing RADAR Dataset to Achieve Proposed Efficiency

1 - Test GAN on Public Dataset for Proposed Efficiency

2 - Else, Try Different GAN Architectures to Achieve Proposed Efficiency

Label the Generated GAN-Based Improved RADAR Data and Make it Ready to Train Human Activity Recognition Model

Procedure



Proceed with Each Explained Functional Approach X, X', Y and Z to Implement the Project

Conclusion

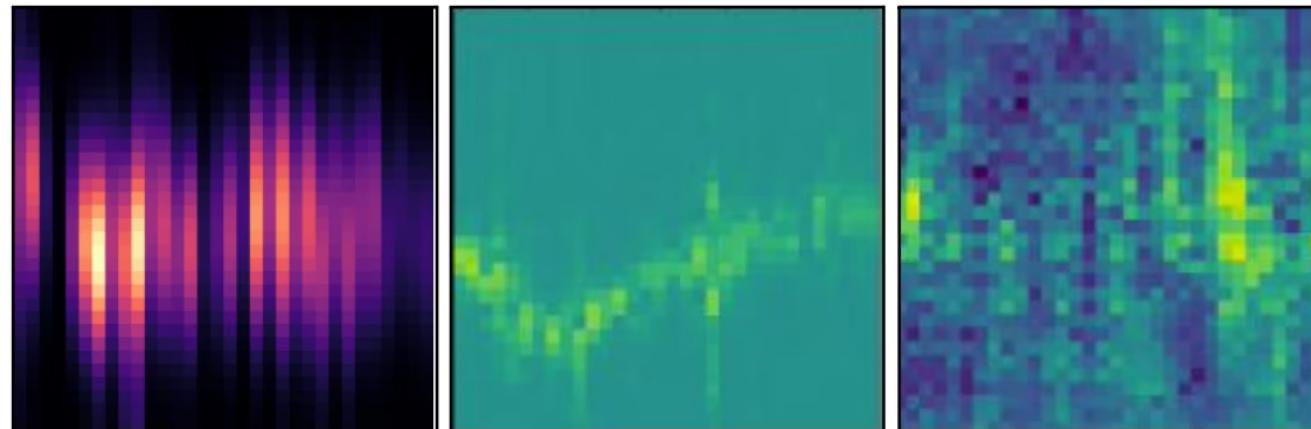
FOCUS	APPROACH	GOALS
Augmenting the Quality of GAN Generated Improved RADAR Signal	Testing Existing Pix2Pix GAN Model to Achieve Proposed GAN Efficiency Or Utilizing Different GAN Architecture Or Extending the RADAR Data	Creating High Quality GAN-Based Improved RADAR Dataset for Training Human Activity Recognition Model

Extras

Application of HAR

- Healthcare
- Fitness and Sports Tracking
- Smart Homes
- Security and Surveillance
- Virtual Reality and Gaming

Experimentation - Utilisation of Range-Doppler



From Left to Right, Synthesized RADAR Signal Data, Real RADAR Signal Data, Improved RADAR Signal Data

Thank you

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Video2RF - GAN for HAR

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