PRECISE SYSTEMS' **Y-STN**

SPECTRUM ANALYSIS

Spectrum analysis technologies are foundational to modern electromagnetic warfare because they provide the real-time situational awareness, threat characterization, and decision support needed to dominate the congested and contested electromagnetic spectrum. By detecting, identifying, geolocating, and characterizing emitters, these capabilities underpin the full EW triad: Electronic Support (rapid warning and targeting), Electronic Attack (precision, proportional jamming and deception), and Electronic Protection (resilience, deconfliction, and emission control). Advanced spectrum analysis enables dynamic spectrum management to avoid fratricide and interference, optimizes blue-force emissions for survivability, and accelerates kill chains with high-confidence signal intelligence.

Y-STN IS A COMPLETE RF DATA ANNOTATION, SPECTRUM ANALYSIS, AND ML MODEL TRAINING WORKFLOW THAT IS FULLY COMPATIBLE WITH THE SIGMF STANDARD. IT IS COMPRISED OF TWO MAJOR TOOLS: **THE ANNOTATOR** & **THE TRAINER**.

THE ANNOTATOR

IMPORTS & AUTO-ANNOTATES IQ DATA FILES, SAVING HOURS OF MANUAL ANNOTATION. IT CONTAINS TEMPLATES FOR FREQUENCY HOPPING, TIME DIVISION/MULTIPLEXING, & BURST MODES WITH FREQUENCY LOCK & UNBOUND HOPPING, & STORES THE ANNOTATED REGIONS AS METADATA FILES.

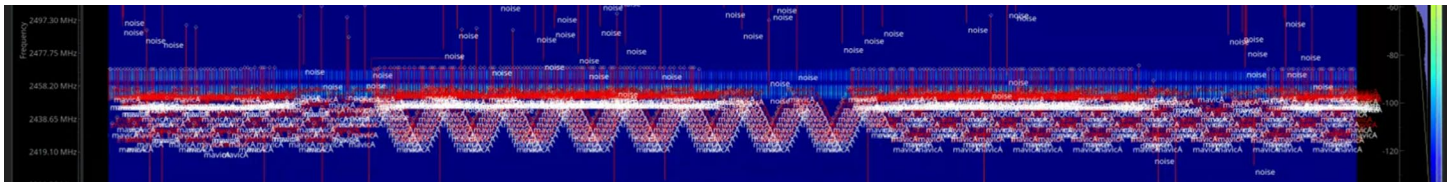

Figure 1: Auto-Annotated IQ Datafile

THE TRAINER

CONSISTS OF TWO PRIMARY MODULES: THE SPECTRUM ANALYZER &THE MODEL TRAINER.

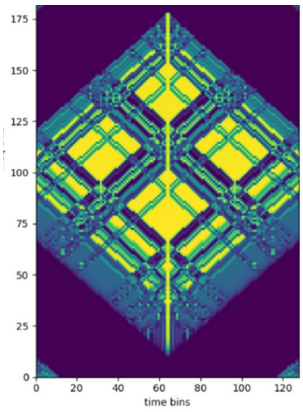

Figure 2: Cyclostationary Features

THE SPECTRUM ANALYZER

parses the metadata files created by the Annotator and extracts the features from the dataset. The user can then convert the extracted features across a number of domains (e.g. Time / Frequency, Cyclostationary etc.).

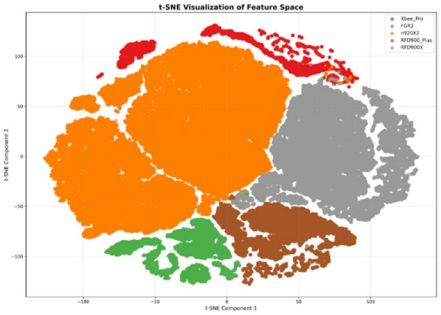

Figure 3: Latent Space Analysis

THE MODEL TRAINER

can train a range of ML models, including ResNet (18, 34, 50, 101, 152) and YOLO (XL, L, M, S, Nano), with a tool architecture that is designed to accommodate additional models, including custom models, easily. The Model Trainer includes a comprehensive set of optimization parameters and performance analysis tools.

Our models can be trained for many signal analysis applications, including signal classification, emitter fingerprinting, anti-fratricide, anti-spoof, and many more. The flexibility of the Y-STN workflow, and customizable model options enables a rapid capability development and maintenance lifecycle. Coupled with our in-house edge deployment technology, our spectrum analysis package enables our customers to harness the power of AI where it is most critical in the front-line systems where **every second counts.**

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