RF SIGNAL CLASSIFICATION (MODULATION)

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OBJECTIVE

To get first hands-on experience of :

- How Deep Neural Network/Deep Learning works in practice
- Working with Environment/setup: Anaconda, Google collaborator, Docker
- Working with Keras, Tensorflow, Theano, numpy, matplot
- Migrating from Python 2.x to Python 3.x
- Generating and using Dataset
- How RF I/Q data based Deep Learning CNN Model trains
- Model Accuracy Vs Hyper parameter Vs epoch Vs dataset size
- CPU vs GPU learning rate difference

DEPENDENCIES

Software

- ENVIRONMENT:
  - Anaconda, Google Collaborator, Docker
- DL:
  - Keras, Tensorflow, Theano
- SDR:
  - GNU Radio
  - out-of-tree (OOT) gr-Module

DATASET

Synthetic

- Tiny [20,000 I/Q sample] Modulation[2] SNR [-20 to 18 dB]
  - Generated locally by limiting the modulation class to only two i.e. (CPFSK & GFSK). 10,000 samples/modulation
- Big [110,000 I/Q sample] Modulation[11] SNR [-20 to 18 dB]
  - Downloaded from deepsig-datasets-RML2016.10a.tar.bz2

Real

- Downloaded from Featurized_RF_Signal_Classification Dataset *

MODIFICATION MADE IN TEMPLATE

- To make it compatible with Python 3.x
  - Map and cPickle adaptation
- Run using Tensorflow as backend
  - To Use GPU acceleration
- Run using Theano as backend
- Run on google collaboration platform
- Data set correct loading
  - encoding=latin1

REFERENCES

- Over the Air Deep Learning Based Radio Signal Classification
- iNETS_RFSig_v1_documentation.pdf
- radioML
- Gnuradio
- gtc-deep-learning-applications-for-radio-frequency-rf-data