

The background is a teal-to-blue gradient with a subtle pattern of white dots. Overlaid on the left side are several concentric circular patterns. One prominent circle has a scale from 140 to 260 in increments of 10, with tick marks. Other circles have dashed lines and arrows indicating a clockwise direction. The main title is centered on the right side in a large, white, sans-serif font.

# 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, matplotlib
- 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](#)