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Musical Instrument Classification Using a Hybrid Neural Network

1. Abstract (Completed, may need editing)
2. Introduction
   1. Why use Neural Networks
   2. Basic Functions – Features, Layers, Optimization
      1. Computational graph representation
      2. Layer types/ activations used.
3. Properties /Features of Musical Instruments
   1. Hornbostel-Sachs classification
      1. Properties of Idiophones
      2. Properties of Membranophones
      3. Properties of Chordophones
      4. Properties of Aerophones
   2. What do these properties tell us?
      1. Use the properties to develop features
      2. Mechanical behavior allows us produce features
4. The Neural network
   1. Input and Output
      1. Inputs are features
      2. Outputs are predictions
   2. The features used (extracted from each file)
      1. Spectrogram (Image w/ 1 channel)
      2. Feature Vector (1 x 20) array
      3. Gives rise to a network w/ two input nodes!
   3. The Mutlimodal network model
      1. Computational graph representation
      2. Aggregating Results, Ensemble methods?
5. Experimental Classification Results
   1. Using K-Folds X-Validation
      1. Bagging Method?
   2. Report of Metrics
      1. Loss, Accuracy, Precision, Recall scores
      2. Metrics over a period of training
      3. Metrics on Validation set
   3. Final Classifications
      1. Compare Features/ Spectrogram
      2. Compare a few unlabeled examples
6. Conclusion?
   1. Effectiveness of multi modal network?
   2. Comparison to JUST spectrogram of JUST feature vector.