ELEN4012 - Feature Based Automatic Modulation Classification

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Abstract: Automatic modulation classification involves identifying the modulation scheme used in a signal without the decision being guided by an operator. This report covers a preliminary investigation into the design and implementation of such a system. An overview of the relevant literature is presented and proposals are made regarding the details of the implementation and testing of such a system using and Ettus USRP.

Key words: modulation, classification, USRP, UHD

1. INTRODUCTION

2. LITERATURE SURVEY

Zhu and Nandi [1] identifies three major approaches to automatic modulation classification; likelihood-based, distribution-test-based and feature-based. These are briefly detailled below.

2.1 Likelihood Based Classification

2.2 Distribution Test Based Classification

2.3 Feature Based Classification

Feature based AMR has been shown to be non-ideal, but significantly less computationally intensive [1] than the aforementioned methods.

There are again three major approaches to feature-based AMC. These make use features derived from either the signal spectrum, the wavelet transform of the signal or high-order statistical representations of the signal [1].

The classification of analog modulation schemes using spectral features is well documented by Zhu and Nandi [1] as well as Azzouz and Nandi [2].

3. EXISTING SOLUTIONS AND APPLICATIONS OF AMC

3.1 Military

3.2 Civilian

4. DESIGN PROCESS OVERVIEW

4.1 Development Methodology

4.2 Estimated Project Schedule

4.3 Estimated Costs and Hardware Required

5. IMPLEMENTATION OVERVIEW

5.1 Hardware

5.2 Software

5.2.1 Basic Software Structure

5.2.2 Libraries and API's

5.2.3 Build System

6. PROPOSED TESTING PROCEDURE

6.1 Simulated Testing

6.2 Practical Testing

7. CONCLUSION AND RECOMMENDATIONS

REFERENCES

[1] Z. Zhu and A. K. Nandi. *Automatic Modulation Classification: Principles, Algorithms and Applications*. John Wiley & Sons, 2015.

[2] E. Azzouz and A. Nandi. *Automatic modulation recognition of communication signals*. Springer Science & Business Media, 2013.