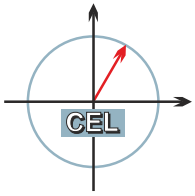
Karlsruhe Institute of Technology
Communications Engineering Lab



TBS

Master's Thesis

Nicolas Cuervo-Benavides

Advisor	:	Dr.-Ing. Holger Jäkel
Supervisor	:	MSc. Felix Wunsch

Start date	:	17th May 2017
End date	:	6th December 2017

Declaration

With this statement I declare that I have independently completed the above master's thesis. The thoughts taken directly or indirectly from external sources are properly marked as such. This thesis was not previously submitted to another academic institution and has also not yet been published.

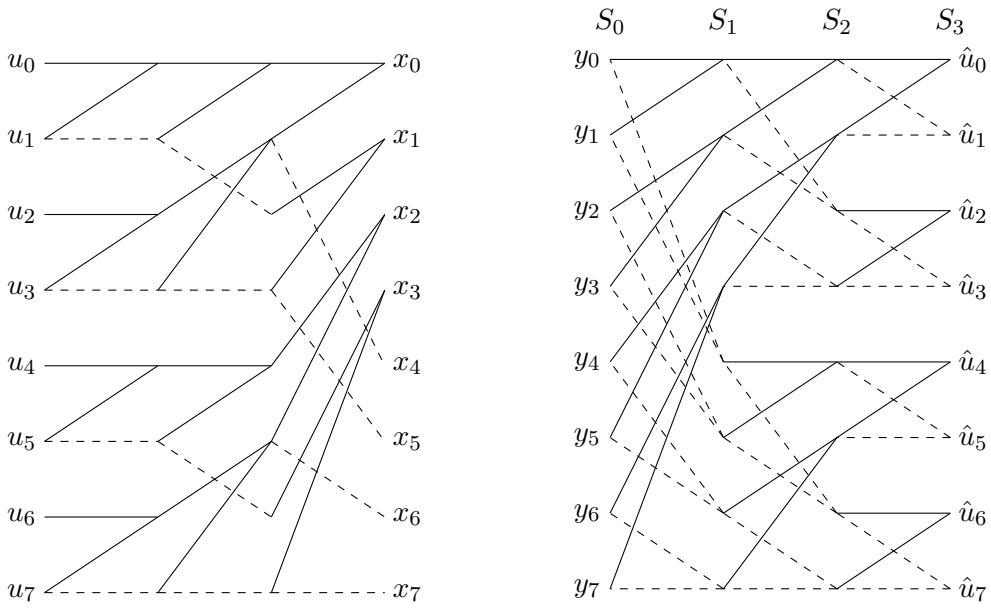
Karlsruhe, 06.12.2017

Nicolas Cuervo-Benavides

Abstract

This is an abstract.
CEL thesis rules require it to be about 3-5 pages. It is a summary of what you do in your thesis. Use around 5 pictures and outline whatever you did. And now a few lines of information.
Polar codes are the first codes to asymptotically achieve channel capacity with low complexity encoders and decoders. They were first introduced by Erdal Arikan in 2009 [Ari09]. Channel coding has always been a challenging task because it draws a lot of resources, especially in software implementations. Software Radio is getting more prominent because it offers several advantages among which are higher flexibility and better maintainability. Future radio systems are aimed at being run on virtualized servers instead of dedicated hardware in base stations [RMP+15]. Polar codes may be a promising candidate for future radio systems if they can be implemented efficiently in software.
In this thesis the theory behind polar codes and a polar code implementation in GNU Radio is presented. This implementation is then evaluated regarding parameterization options and their impact on error correction performance. The evaluation includes a comparison to state-of-the-art Low-Density Parity-Check (LDPC) codes.

This is a todo example



(a) 8 bit polar encoder **(b)** 8 bit polar decoder

Figure 0.1.: Polar code encoding and decoding

The polar encoder is shown in Fig. 0.1a.

Contents

1. Introduction

Give a short introduction about cognitive radio and overlay systems
description of the problem
Describe the Dyspan spectrum challenge and its setup
briefly descirbe our particpataion and things done
This is the introductory chapter. It is usually a page or two. Tell a story about the objectives, explain them briefly and outline the structure of your thesis.
And don't forget 10.0815 GB of data is quite a lot. This is an example how to use the siunitx package.

2. Artificial Intelligence - Introduction

HERE I PLAN TO DESCRIBE THE THEORY BEHIND THE SCENES THAT HAS BEEN USED FOR THE DEVELOPMENT OF THIS THESIS

2.1. Overview

2.2. Machine Learning

2.2.1. Training Models

2.2.2. Testing Models

2.2.3. Model Evaluation

Overfitting

Underfitting

2.2.4. Supervised Learning

2.2.5. Feature Engineering

K-nearest Neighbors

Support Vector Machines

Binary trees

2.2.6. Unsupervised Learning

2.2.7. Reinforcement Learning

2.3. Deep Learning

2.3.1. Neural Networks

2.3.2. Convolutional Neural Networks

2.3.3. Optimization of Cost Functions

3. Testbed Implementation

3.1. Software Defined Radio approach

3.1.1. GNURadio

3.1.2. Universal Software Radio Peripheral

3.2. Machine Learning models in Python and Jupyter

3.2.1. scikit-learn

3.2.2. keras

3.3. Data set Generation

3.3.1. Measure Campaign

3.3.2. Feature Engineering

3.3.3. Spectrograms generation

4. Evaluation and Results

4.1. Scenario Classification

4.2. Performance metrics

4.3. Dyspan setup comparison

5. Live implementation in GNURadio

6. Conclusion

So you made it! This is the last part of your thesis. Tell everyone what happened. You did something... and you could show that ... followed.
In the end make a personal statement. Why would one consider this thesis to be useful?

A. Abbreviations

LDPC Low-Density Parity-Check

Bibliography

[Ari09] Erdal Arikan. Channel polarization: A method for constructing capacity-achieving codes for symmetric binary-input memoryless channels. *Information Theory, IEEE Transactions on*, 55(7):3051–3073, July 2009.

[RMP+15] P. Rost, A. Maeder, H. Paul, D. Wübben, A. Dekorsy, G. Fettweis, Ignacio Berberana, Vinay Suryaprakash, and Matthew Valenti. Benefits and challenges of virtualization in 5g radio access networks. *accepted for publications in Special Issue Advanced Cloud & Virtualization Techniques for 5G Networks of the IEEE Communications Magazine*, Dec 2015.