Royal Academy of Engineering International Travel Grant Report (ITG 08-663)

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1   Introduction

The award of an international travel grant from the Royal Academy of Engineering enabled me to travel to Toronto, Canada in order to present my paper at the IEEE International Symposium on Information Theory (ISIT). The paper is titled "Asymptotically Good LDPC Convolutional Codes Based on Protographs", and is co-authored with Dr. Ali Pusane, Prof. Kamil Zigangirov, and Prof. Daniel Costello from the University of Notre Dame, Indiana, USA. ISIT is the flagship event for the Information Theory community. I was delighted to have the opportunity to attend and present technical material at such a prestigious conference. The International Symposium on Information Theory covers a vast range of topics. The sessions include, for example, communication theory, information theory, signal processing, and my primary field channel coding. As I have a background in mathematics, the theoretical aspects of channel coding appeal strongly to me, and this is the ideal conference for me to display my research.

2   Pre-conference goals and preparation

Prior to attending the conference my main goals were as follows:

- To gain experience of presenting technical material at a scholarly conference. This was of particular importance as I aim for a career in academia in the UK following my postgraduate degree;

- Secondly, it was a fantastic opportunity to meet the leading researchers in my field. I hoped to become involved in stimulating discussions outside the presentations regarding recent advances in channel coding;

- Finally, attending such a large conference should enhance my subject knowledge and allow me to extend it to surrounding areas of importance. It would be beneficial for my career to learn what new and upcoming research is of interest to the community.

These goals were formed with the intention to continue to establish myself as a valuable member of the research community.

As mentioned above, our paper had been selected for an oral presentation, so it was important to spend time before the conference choosing what material to include in the talk and design attractive slides. The technical program was published online prior to the conference. This allowed me to research which sessions and talks were the most important for me to attend. In addition, a resource I found particularly useful was the *arxiv* website (http://arxiv.org/), as the ISIT committee encourages authors to upload their papers here in advance of the symposium.

3   ISIT 2008

There were eight sessions running in parallel four times per day. Due to the organized technical programme, similar topics were usually given distinct time slots throughout the symposium. Channel coding in particular is a popular topic, and one that has a lot of theoretical and practical aspects. Whilst my work is quite theoretical, it is important that I keep up to date with the practical applications. Thus, it was necessary at times to move between sessions. This was reasonably easy due to the strict time-keeping by the session chairs. Further, there were some time slots that had no devoted channel coding sessions. This allowed me to attend some unrelated interesting topics that may prove useful for future research, such as quantum codes, compressed sensing and network coding. Combining these with the stimulating plenary talks have given me a nice insight into surrounding research areas.

My talk was recieved very well. It had been well practiced and I managed to keep to time. The session was titled "LDPC Convolutional Codes and Woven Codes", and there was an excellent attendance with roughly 100 people watching. I had time for a quick question afterwards regarding how I see our research developing in the future and possible applications of this work: my response was greeted with enthusiasm. Afterwards, Prof. Michael Tanner, an early pioneer of Low-Density Parity-Check codes, introduced himself. He posed a couple of technical questions and gave some nice words of encouragement. This work is based on advanced techniques developed initially at the NASA Jet Propulsion Laboratory (JPL) in California. Dr. Pusane and I also had a productive conversation with Dr. Kenneth Andrews of JPL labs, regarding the future directions of our work. Based on this discussion and the fact our work is closely related we are currently considering a joint project with the group.

4   Summary

To conclude, I would like to thank the Royal Academy of Engineering for enabling me to have this fantastic opportunity. As discussed in the report, ISIT was a very rewarding and enjoyable experience. Throughout the conference I was able to meet many researchers, both established academics and students alike. I attended lots of interesting talks and have a good idea as to the current direction of the channel coding research community and what topics will be of significant interest in the next few years. Importantly, this has given me new ideas regarding how to develop my own research. Personally, my talk went very well and a good number of people displayed an interest in our work. The conference was very well organized and the talks were of very high technical standard. Overall, I found attending this conference very worthwhile and motivational. I now aim to continue this work and prepare a submission to ISIT 2009.