KAUSHIK SENTHOOR

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About me

I am a researcher who recently completed my doctoral research at Indian Institute of Technology Madras. My research is in the area of quantum error correction codes. More specifically, my work focuses on reducing the communication cost for secret recovery in quantum secret sharing schemes. In the past, I also worked on problems in compressed sensing, image processing and distributed storage codes. I will begin my work as a postdoctoral research fellow this November. I am currently looking for a short-term research/programming/teaching job suited to my skill set.

Research interests

Classical and quantum error correction codes, information theory, distributed storage and signal processing

Education

Ph.D. in Electrical Engineering   Jan 2016 - Jul 2023

Indian Institute of Technology Madras

Advisor : Prof. Pradeep Sarvepalli

Thesis   : Communication Efficient Quantum Secret Sharing Using Quantum Codes

M.E. in Telecommunication Engineering   Aug 2012 - Jul 2014

Indian Institute of Science Bangalore

Advisor : Prof. P Vijay Kumar

Thesis   : Storage Overhead vs. Repair Bandwidth Tradeoff in Exact Repair Regenerating Codes

B.Tech. in Electronics & Communication Engineering   Aug 2008 - Jul 2012

Amrita School of Engineering Coimbatore

Group project : Compressed sensing in ECG signals

Work Experience

Engineer   Aug 2014 - May 2015

Mobile-Video team, Ittiam systems, Bangalore

Development of video codecs in H264 and HEVC standards

Project Associate   Jun 2015 - Dec 2015

Codes and Signal Design lab, Indian Institute of Science Bangalore

Project for intrusion detection using Wireless Sensor Networks

Programming

I developed an expertise in C and MATLAB from my undergraduate courses and Masters research. I particularly liked to formulate theoretical problems as computational models to be programmed and analyzed using these languages. I also have some exposure to C++ programming from my undergraduate courses. After my Masters, I worked as an engineer for a short duration doing software development of video codecs using assembly language. Currently I am interested in learning the basics of Python and the IBM Qiskit, considering their growing relevance.

Languages

I have professional proficiency in English and native proficiency in Tamil. I am open to learning new languages depending on the job requirements.

PUBLICATIONS

Journal papers

[1] K. Senthoor and P. K. Sarvepalli, "Theory of Communication Efficient Quantum Secret Sharing," *IEEE Transactions on Information Theory*, vol. 68, no. 5, pp. 3164–3186, 2022.

[2] K. Senthoor and P. K. Sarvepalli, "Communication efficient quantum secret sharing," *Physical Review A*, vol. 100, no. 5, p. 052313, 2019.

[3] B. Sasidharan, N. Prakash, M. N. Krishnan, M. Vajha, K. Senthoor, and P. V. Kumar, "Outer bounds on the storage-repair bandwidth trade-off of exact-repair regenerating codes," *International Journal of Information and Coding Theory*, vol. 3, no. 4, pp. 255–298, 2016.

Conference proceedings

[4] K. Senthoor and P. K. Sarvepalli, "Concatenating Extended CSS Codes for Communication Efficient Quantum Secret Sharing," in *e-print quant-ph/2002.09229,* accepted for *Proc. 2023 International Symposium on Topics in Coding.*

[5] K. Senthoor and P. K. Sarvepalli, "Universal Communication Efficient Quantum Threshold Secret Sharing Schemes," in *Proc. 2020 IEEE Information Theory Workshop (ITW), Riva del Garda, Italy.*

[6] K. Senthoor, B. Sasidharan, and P. V. Kumar, "Improved layered regenerating codes characterizing the exact-repair storage-repair bandwidth tradeoff for certain parameter sets," in *Proc. 2015 IEEE Information Theory Workshop (ITW), Jerusalem, Israel.*

[7] B. Sasidharan, K. Senthoor, and P. V. Kumar, "An improved outer bound on the storage-repair-bandwidth tradeoff of exact-repair regenerating codes," in *Proc. 2014 IEEE International Symposium on Information Theory*, pp. 2430–2434.

PRESENTATIONS

- Presentation at AQIS 2018, Nagoya, Japan.
- Virtual presentation at IEEE ITW 2020, Riva del Garda, Italy.
- Poster at Indo-German Symposium on Quantum Science and Technologies 2020, IIT Madras, India.

ACADEMIC SERVICES

- Reviewed a paper for IEEE Transactions on Information Theory in 2021.
- Reviewed three papers for National Conference on Communications in 2017, 2018 and 2019.
- Reviewed a paper for IEEE International Symposium on Information Theory 2014.

TEACHING EXPERIENCE

Applied Linear Algebra I, Jul - Nov 2018

- One of four teaching assistants for a class of about 50 students.
- Conducted weekly tutorial sessions and discussed the solutions for problem sets.
- Evaluated video presentations by students on recent research articles.

Information Theory (online mode), Jul - Nov 2022

- One of seven teaching assistants for a class of about 60 students.
- Conducted weekly tutorial sessions for a group of 10 students.
- Partly evaluated the mini-quiz and final exam papers.

I worked as teaching assistant also in courses such as Error Control Codes, Modern Coding Theory and Advanced Topics in Quantum Information during my Ph.D. programme.