

Information Theory in India

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Abstract

In this brief paper the authors survey the contributions to information theory by Indian scientists working in India.

1 Introduction

Information theory is an outgrowth of the study of communication signals and systems. It was founded in 1948 by Claude Shannon. Due to confidentiality issues at Bell Labs and related organizations, this document was not really available right away. Eventually information theory was widely known and today is a major field of study, with its own IEEE society.

Indian scientists have been active in statistics from the early 20th century. So it is not surprising that they take an interest in information theory as well. This paper is structured as follows. In Section 2 we present our survey results highlighting the prominent areas of contribution by Indian scientists. In Section 3 we conclude with an offering of future perspectives. As a disclaimer, this paper is extremely limited in the data that was gathered for the survey, but it is a first step in what can only be called an important subject of investigation.

2 Contributions to Information Theory in India

Filters and Codes

If we look at the first data point, which represents the decade from 1970 to 1980 and examine the 34 results, we find a paper by Surendra Prasad from 1977 which looks at, “Class of min-max digital mti filters for clutter rejection.” Another paper by the same author looks at analog communication. Surendra Prasad is still active, although he has migrated to different fields. There is also a 1979 paper by D. Raychaudhuri which looks at tree codes

Receiver and Encoder Design

For the next data point, double in magnitude, we find a study of Poisson moment functionals by D. C. Saha from 1980. It is an IIT Kharagpur document. A 1981

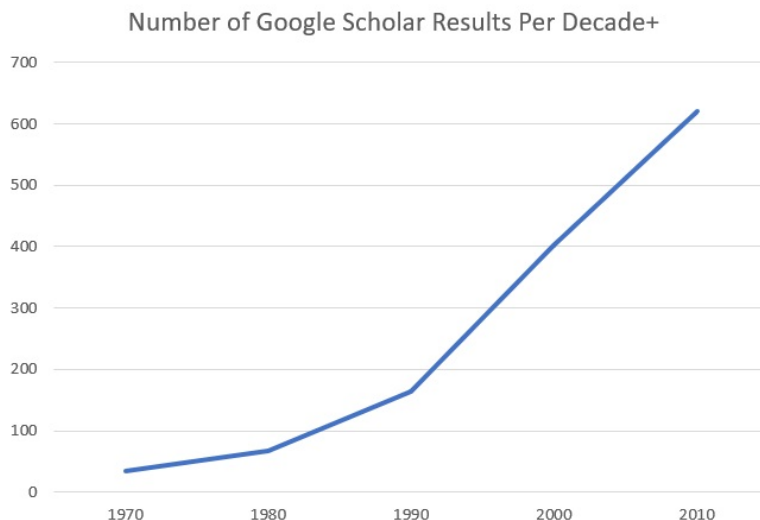


Figure 1: The horizontal axis labels the starting year of the decade for which the vertical axis gives the number of Google Scholar search results for the term “signal set” and including either “Indian” or “IIT” in the paper. Due to the inefficiency of the search filter, not all results were by Indians working in India.

paper by V. K. Jain looks at optimum receiver design for atmospheric radio noise. There is a 1986 paper by P. Krishnasami which looks at encoder design and quantization. A 1989 paper by Pillai looks at smoothing techniques for signal identification.

Coding, Decoding and Detection

Jumping data points in the interest of brevity, we come to the final one, of magnitude 620. A 2012 paper by Shivakumar looks at divergence measures for signal detection. In 2017, Sudhakaran and Rajan look at maximum likelihood decoding. In 2019, Ahuja and Garg study sensor noise cancellation. In 2020, A. Datta et. al. study symbol detection in MIMO systems. S. Bhat looks at precoding and channel modulation in 2020 as well.

3 Conclusion

We find that at least from 1970 onwards, information theory and allied topics have received the attention of Indian scientists. In the last decade (2010-2020) we find most of the major topics of information theory tackled by Indians working in India.

Interest in information theory is clearly growing steadily in India as Figure 1 shows. Artificial intelligence is another “in” field in India and has substantial

potential overlap with information theory. So the future prospects for the growth of information theory in India are bright.