

國立中山大學應用數學系

學術演講

講者：鄭皓中教授

國立臺灣大學 電機工程學系

講題：Noncommutative Rényi and Augustin Information

時間：2020/11/23 (Monday) 14:10 ~ 15:00

地點：理學院四樓理 SC 4009-1 教室

茶會：13:40 於理 SC 4010 室 (系辦公室)

Abstract

Rényi and Augustin information are generalizations of mutual information defined via the Rényi divergence, which play a significant role in evaluating the performance of information processing tasks by virtue of its connection to the error exponent analysis. In quantum information theory, there are three generalizations of the classical Rényi divergence---the Petz's, sandwiched, and log-Euclidean versions, that possess meaningful operational interpretation. However, the associated quantum Rényi and Augustin information are much less explored compared with their classical counterpart, and lacking crucial properties hinders applications of these quantities to error exponent analysis in the quantum regime.

The goal of this paper is to analyze fundamental properties of the Rényi and Augustin information from a noncommutative measure-theoretic perspective. Firstly, we prove the uniform equicontinuity for all three quantum versions of Rényi and Augustin information, and it hence yields the joint continuity of these quantities in the orders and prior probabilities. Secondly, we establish the concavity of the scaled Rényi and Augustin information in the region of $\ln(-1,0)$ for both Petz's and the sandwiched versions. This completes the open questions raised by Holevo [IEEE Trans. Inf. Theory, 46(6):2256-2261, 2000], and Mosonyi and Ogawa [Commun. Math. Phys, 355(1):373-426, 2017]. For the applications, we show that the strong converse exponent in classical-quantum channel coding satisfies a minimax identity, which means that the strong converse exponent can be attained by the best constant composition code. The established concavity is further employed to prove an entropic duality between classical data compression with quantum side information and classical-quantum channel coding, and a Fenchel duality in joint source-channel coding with quantum side information. This talk is based on arXiv:1811.0421 [quant-ph]

國立中山大學應用數學系

敬請公告！歡迎參加！

應用數學系：<http://math.nsysu.edu.tw>

校園地圖：http://math.nsysu.edu.tw/var/file/183/1183/img/779/nsysu_math_map.jpg

交通資訊：<https://www.nsysu.edu.tw/p/412-1000-4132.php?Lang=zh-tw>

應用數學系



校園地圖



交通資訊

