报告题目：Gamma Rate Theory for Causal Rate Control in Source Coding and Video Coding

报告人：Prof. Dapeng Oliver Wu

报告时间：

报告地点：中国科学技术大学西活报告厅

报告人简介：
Dapeng Oliver Wu received Ph.D. in Electrical and Computer Engineering from Carnegie Mellon University, Pittsburgh, PA, in 2003. Since 2003, he has been on the faculty of Electrical and Computer Engineering Department at University of Florida, Gainesville, FL, where he is currently Associate Professor. His research interests are in the areas of networking, communications, video coding, image processing, computer vision, signal processing, and machine learning.

He received University of Florida Research Foundation Professorship Award in 2009, AFOSR Young Investigator Program (YIP) Award in 2008, ONR Young Investigator Program (YIP) Award in 2008, NSF CAREER award in 2007, the IEEE Circuits and Systems for Video Technology (CSVT) Transactions Best Paper Award for Year 2001, and the Best Paper Award in International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine) 2006. Currently, he serves as an Associate Editor for IEEE Transactions on Wireless Communications, IEEE Transactions on Circuits and Systems for Video Technology, and International Journal of Ad Hoc and Ubiquitous Computing. He was the founding Editor-in-Chief of Journal of Advances in Multimedia between 2006 and 2008, and an Associate Editor for IEEE Transactions on Vehicular Technology between 2004 and 2007. He is also a guest-editor for IEEE Journal on Selected Areas in Communications (JSAC), Special Issue on Cross-layer Optimized Wireless Multimedia Communications. He will serve as Technical Program Committee (TPC) Chair for IEEE INFOCOM 2012, and has served as TPC Chair for IEEE International Conference on Communications (ICC 2008), Signal Processing for Communications Symposium. He serves as Chair for the Award Committee, Technical Committee on Multimedia Communications, IEEE Communications Society.

报告摘要：

The rate distortion (R-D) function in information theory provides performance bounds for systems of source coding including video coding. It is well known that the R-D function for non-causal coding of a Gaussian sequence is in the form of reverse water-filling. However, it is not clear how to causally encode a Gaussian sequence under rate constraints while achieving R-D optimality. This problem has significant implications in the design of rate control for video communication over wired/wireless networks such as Internet TV and wireless video. To address this problem, we theoretically study the impact of distortion fluctuation on rate control, and develop a new theory, called Gamma rate theory. Gamma rate theory not only provides new...
performance measures for evaluating rate control schemes in video coding, but also quantifies the fundamental trade-off between viewer friendliness (i.e., smooth video quality over time) and network friendliness (i.e., low bit rate), which is not known previously.