University of Cyprus
School of Engineering
Department of Electrical and Computer Engineering

BAYESIAN METHODS IN GENOME-WIDE ASSOCIATION STUDIES

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Room KENTP – E002, Old Campus

University of Cyprus

Abstract:

Genome-wide association studies (GWAS) have fundamentally altered the study of genetics in recent years by allowing genome-wide screening of single nucleotide polymorphisms (SNPs) for association with a variety of common diseases with many significant findings. The accuracy and power of the association tests and other methods used in GWAS, greatly depends on the sample size of the study. Unfortunately, even nowadays, the costs of genotyping additional individuals in order to increase the sample size are still high. In this work we present methods that incorporate additional phenotypic information or datasets that are available for small or no cost (e.g. bio-banks, previous studies etc.) in order to increase the likelihood of identifying true genetic associations. Genetic data are commonly vast, not so much in terms of individuals but mostly in terms of genetic markers. As such, simple frequentist statistical methods are usually favoured over their Bayesian counterparts. This is mostly due to the fact that Bayesian methods are, in general, more computationally expensive than frequentist methods. However, Bayesian statistics allow us more flexibility when it comes to statistical modelling and hypothesis testing. We utilise this flexibility to address issues in GWAS that traditional frequentist statistics cannot.

Biography:

Charalambos is currently a researcher at KIOS Center for Intelligent Systems and Networks at the University of Cyprus. He recently finished his D.Phil thesis with title “Extensions of the Case-Control design in Genome-wide Association Studies” in the University of Oxford. His research interests include statistical genetics, genome-wide association studies and statistical analysis of cancer progression models in the microscopic level. He also holds a MSc in Applied Statistics from the University of Oxford and an undergraduate degree in Mathematics and Statistics from the University of Cyprus.