INSTITUTO TECNOLÓGICO AUTÓNOMO DE MÉXICO

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Seminario Aleatorio

Sesión 402

The Relative Belief Inferences in Bayesian Analysis of Multivariate Non-parametric Tests with Application in Generative Models

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Abstract

Multivariate nonparametric tests have proven to be an important tool for statistical inference in a wide array of applied fields including biology, machine learning, data mining, and signal processing. The parametric statistical testing procedures are based on the assumption that observations are generated from some well-known distributions, characterized by some unknown parameters, and then the inferential problems are restricted to estimating these unknown parameters.
Parametric methods are no longer useful when the distributional assumptions are questionable for the data at hand. This is where nonparametric tests come into play, as it does not require us to know the true distribution of the data. Nonparametric tests are divided into two general strategies, frequentist and Bayesian tests. However, using frequentist tests has some limitations, namely that they are especially prone to inflate false positive rates, which is the type I error, when the sample size is small or the study is underpowered. In Bayesian Nonparametric (BNP) methods, the unknown distributions are considered as infinite-dimensiona families of probability models. These kinds of priors are defined through stochastic processes.

The Dirichlet process (DP) is a stochastic process that includes several desirable properties that make it the most common tool in BNP studies.

In this talk, we consider DP as a prior on unknown underlying distribution to construct a general Bayesian method for multivariate non-parametric tests using relative belief inferences.

We address three main multivariate testing problems and propose several BNP discrepancy measures to compute the statistical similarity between the BNP posteriors and the priors. We compared the posterior to the prior via the so-called relative belief ratio as Bayesian evidence to assess the null hypothesis in the desired test. The proposed tests are simple to implement with excellent performances in real applications. Unlike the tests that use p-values, the proposed tests permit us to state evidence for the null hypothesis. Finally, we briefly point out the application of the proposed tests in learning generative adversarial networks.

Viernes 24 de febrero de 2023,
19:00 horas de CDMX,

https://itam.zoom.us/j/96505705820?pwd=YWFmaWhpeWhOMUd6cTRtb2lKR0d5dz09
Meeting ID: 965 0570 5820
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El Seminario Aleatorio del Departamento de Estadística del ITAM está destinado tanto a profesores como a estudiantes, por lo que se agradece a los profesores que colaboren invitando a sus alumnos a estas sesiones.