Some remarks on normal conditionals and normal projections

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Abstract

It is always possible to construct a d-dimensional non-normal distribution having any finite number of normal projections and all $(d-1)$ dimensional marginals normal. Also, there can exist d-dimensional non-normal distribution with all conditional distributions being normal. In the present note we introduce two new characterization of the classical d-dimensional normal distribution. (1) Having normal conditionals and a finite number of normal projections uniquely characterizes the classical d-dimensional normal distribution. (2) Having normal conditionals and each of $(d-1)$ coordinate random variables having a one dimensional normal distribution is sufficient to ensure that the d-dimensional distribution has to be classical normal.

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