

Multiple Markov properties for generalized Gaussian processes and their dualities

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Abstract

A stochastic process describes evolutionary random phenomena towards future. Corresponding to this direction, there will be a process describing, as it were, backward evolution from future to present. The dual process is a realization of this fact.

We discuss new understanding of simple Markov property from the viewpoint of duality. Simple Markov property claims that when present value is known, the past and the future becomes independent. This kind of dependency should be preserved even when we come to a generalization (like N -ple Markov) of Markov property.

We restrict our attention to Gaussian processes for which multiple Markov property is well investigated. This property expresses way of dependence of involved randomness as time goes by. We can therefore expect that such a process with multiple Markov property would present an exact form of the dual process.

We shall show that having defined generalized Gaussian process with multiple Markov property, we can construct the dual process satisfying the properties that we claim. The analysis for this can be done in the space of Hida distributions.