

Adaptive Data Based Modelling and Estimation with Application to Real Time Vehicular Collision Avoidance

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Abstract. The majority of control and estimation algorithms are based upon linear time invariant models of the process, yet many dynamic processes are nonlinear, stochastic and non-stationary. In this presentation an online data based modelling and estimation approach is described which produces parsimonious dynamic models, which are transparent and appropriate for control and estimation applications. These models are linear in the adjustable parameters – hence are provable, real time and transparent but exponential in the input space dimension. Several approaches are introduced – including automatic structure algorithms to reduce the inherent curse of dimensionality of the approach. The resultant algorithms can be interpreted in rule based form and therefore offer considerable transparency to the user as to the underlying dynamics, equally the user can control the resultant rule base during learning. These algorithms will be applied to (a) helicopter flight control (b) auto-car driving and (c) multiple ship guidance and control.

References

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Biography

Professor Harris has degrees from the Universities of Southampton, Leicester and Oxford. He is a Fellow of the Royal Academy of Engineering, Honorary Professor at University of Hong Kong; Holder of the 2001 Faraday Medal and the 1998 IEE Senior Achievement Medal for research into Nonlinear Signal Processing. Author of 7 research books in nonlinear adaptive systems and control theory and over 300 learned papers. Currently he is Emeritus Professor of Computational Intelligence at Southampton University and Director of the UK – MOD Defence Technology Centre in Data and Information Fusion – a £10M a year initiative involving three companies and eight leading UK Universities, supporting over 70 researchers.