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"A statistical model for the temporal pattern of individual ATM withdrawals"

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Abstract:

Statistical models of consumer behaviour based purely upon empirical relationships in data can perform well in the short-run, and are successfully used by retail finance organisations to make better, objective and timely decisions. However, they often degrade rapidly with changing circumstances. Predictive models based upon underlying processes and theories for how and why customers behave in the way they do offer an opportunity of overcoming this problem. In the retail finance context, the deepest level of such models would be based on psychological studies of human behaviour. At a level that is not quite so deep, stochastic models can be built using assumptions about the underlying data-generating process. We consider how to build models at this less-deep level in the context of ATM (Automated Teller Machine) transactions.

Data on ATM transactions information arrives from a large number of different customers. An underlying statistical form for this sort of data is a random-effects model, where each individual has their own behavioural pattern which is a random draw from the population. In this paper, we develop a random-effects point-process model for ATM (Automated Teller Machine) withdrawals. Estimation, prediction and computational issues are discussed. The model may be used to predict behaviour for an individual, assess when state changes in individual behaviour have occurred, and as a description of behaviour for a portfolio of accounts.

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