THE PRIMAL STATE ADAPTIVE CONTROL CHART

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The Quality Measurement Plan (QMP) is a new kind of control chart based on a hierarchical Bayes model. QMP has been successfully implemented at AT&T and Bellcore. Two features of QMP are potential limitations: (i) all past observations in an arbitrary moving window are treated equally and (ii) conditional on the hyper-parameters (process average and variance), the serial correlation is zero. The Primal State model avoids these limitations. The basic idea is that for each period, the true defect rate does not change with probability (1-P); but with probability P, the defect changes to a random Primal State. We present a recursive adaptive filter for this model and make comparisons to QMP. A fascinating result is that for a very large set of real control chart data, QMP forecasts as well as the Primal State model. This indicates that QMP is good enough for practical purposes.

1. Introduction and summary.

The Quality Measurement Plan (QMP) (Hoadley, 1981) was implemented throughout AT&T Technologies (formerly called Western Electric) in 1980 and Bell Communications Research in 1984. QMP is a statistical method for analyzing discrete time series of quality audit data consisting of defects and their

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