STATISTICS AS A TOOL

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It is well known that statistics is the method of extracting valuable information regarding hidden relationships existing between variables in experimental data. However, the analysis could lead to wrong conclusions if the data consists of spurious observations. These type of observations are fairly common in data and can come about due to various reasons such as a recording error, an operator error or due to the addition of a wrong amount of a catalyst etc., Isolating these so called "outliers" has become a challenging problem for statisticians today. Although some work has been done on outlier detection with regard to independant data, a literature survey revealed that very little has been done with respect to time series data. Part of my research was thus, to investigate efficient ways of handling this intriguing problem of outlier detection in time series data.

Research was conducted in this direction under three different topics, viz

i. Off line outlier detection.
ii. Robust Kalman Filtering
iii. Industrial Quality Control

Under the first category I have extended some of my Ph.D work and a paper Co-authored with Bovas Abraham entitled "A score test for detection of time series outliers" was accepted for publication by the journal of the time series analysis in July 1987. Under two, I have again extended ch. 2 of my Ph.D thesis and a paper Co-authored with Bovas Abraham and John Macgregor entitled "A Robust Kalman Filter" was tentatively accepted by the journal of the American Statistical Association in November 1987. In this paper only the observational

outliers were considered and the robust filter was developed assuming that the measurement error may come from either one of two normal distributions with the transitions governed by a Markov Chain. The resulting filter comes out to be a weighted sum of two Kalman filters acting parallel to each other. Under three, Investigations are being carried out to devise newer techniques for industrial quality control based on event detection ideas and preliminary writing of a paper entitled "A Novel Approach to Industrial Quality Control", has just begun.