1. Introduction and Problem Statement

Let $M: T \rightarrow V$ be a function that approximately determines the values of a stream over a set of time instances $T$. By approximately determines we mean that for 2 given functions $\epsilon_1: T \rightarrow V$, negative definite, and $\epsilon_2: T \rightarrow V$, positive definite, we have that:

$$\epsilon_1(t) \leq M(t) - v(t) \leq \epsilon_2(t)$$

for every $t \in T$, with $v: T \rightarrow V, v(t)$ the real value of the stream.

There is a rich body of literature which deals with a very broad range of functions useful for this approximation: polynomial regression [1, 7], Chebyshev polynomials [2], Kalman filters [4], hidden Markov models [6, 5], correlation models [3]. For all of these techniques, there exist a set of characteristics which differentiate between them, which could make one technique more suitable for a given application needs than other.

The purpose of this proposal is the identification of these characteristics, and the design and implementation of an generic automatic measurement process for them. The generic property refers to the process’s ability to measure that characteristic for any given stream data modeling technique, and the automatic property refers to the process’s ability to perform the measurement without human intervention. Given the current technological development in computer technology, the process should be a software application.

2. Problem structuring

This proposal suggests an approach for achieving the stated goal, structured on the following questions:

Question 1. What are the potentially interesting characteristics of a given modeling technique?

Question 2. Are these characteristics measurable for all techniques?

We will refer to a measurable characteristic by the term metric.

Question 3. How can we compute the metrics?

Question 4. What information is needed to carry over the computation of a metric?

Question 5. How can we obtain such information from any modeling technique, with minimal marginal cost? (In economics and finance, marginal cost is the change in total cost that arises when the quantity produced changes by one unit)

References


Date: November 9, 2009.