

Transition Discard Rate: Adaptive Alpha Methodology

J. Michael Lanning, PhD
Discard Methodology Peer Review
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Adaptive Alpha¹

Pros / Cons

- Forecasting Model: Data Driven
- Initialization Method: No need to choose Alpha
 - Seed Rate and Alpha = 1
- Alpha is adjusted by prediction error
 - Alpha increases when error is high (rapidly changing or systematic under/over forecasting)
 - Alpha decreases when error is low (slowly changing)

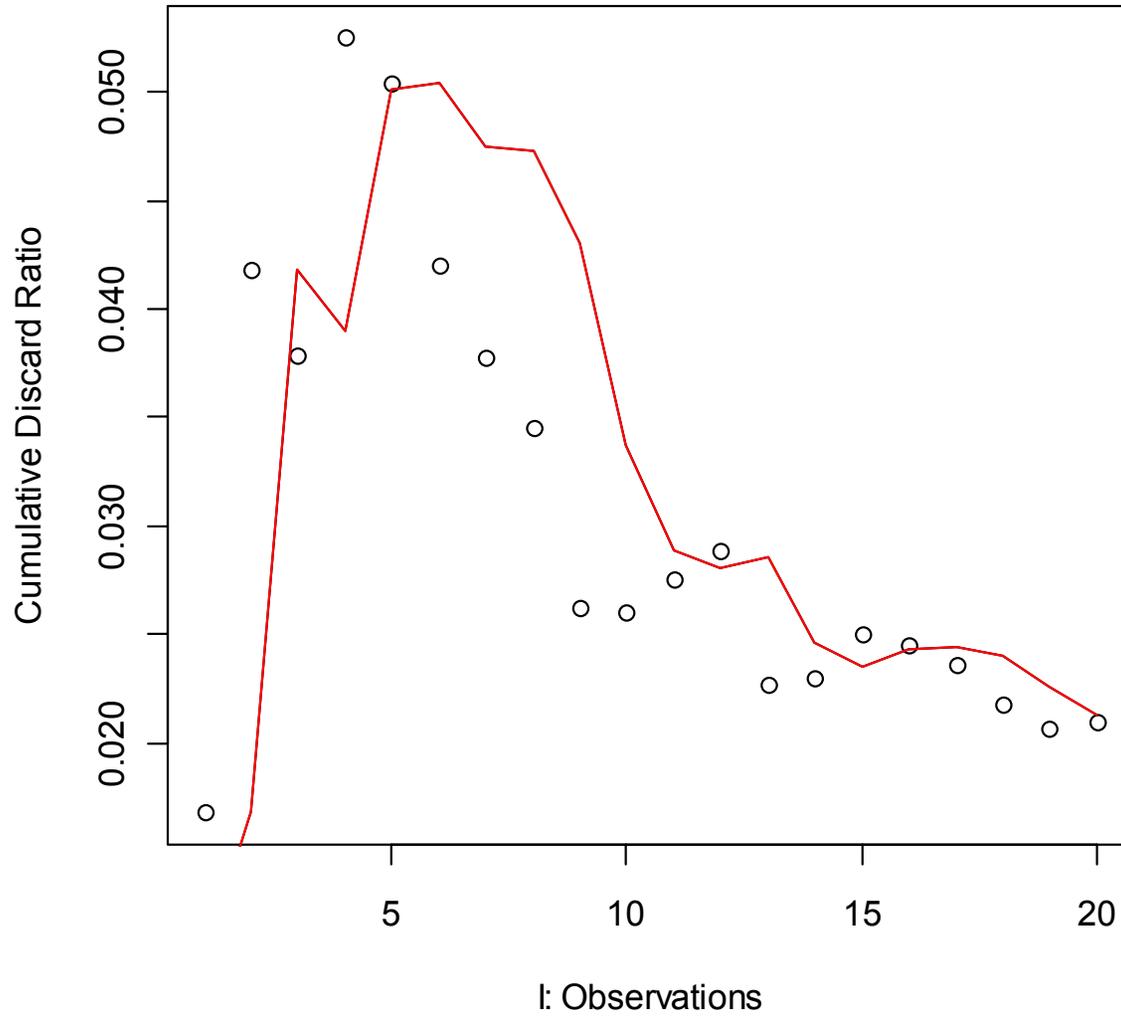
1: Trigg and Leach: “Exponential Smoothing with an Adaptive Response Rate.” Operational Research Quarterly 18 (1967), pp 53-59

$$TR_I = \alpha \cdot SR + (1 - \alpha) \cdot \frac{\sum_{i=0}^I d_i}{\sum_{i=0}^I kall_i}, I = 1 \text{ to } I_{\max}$$

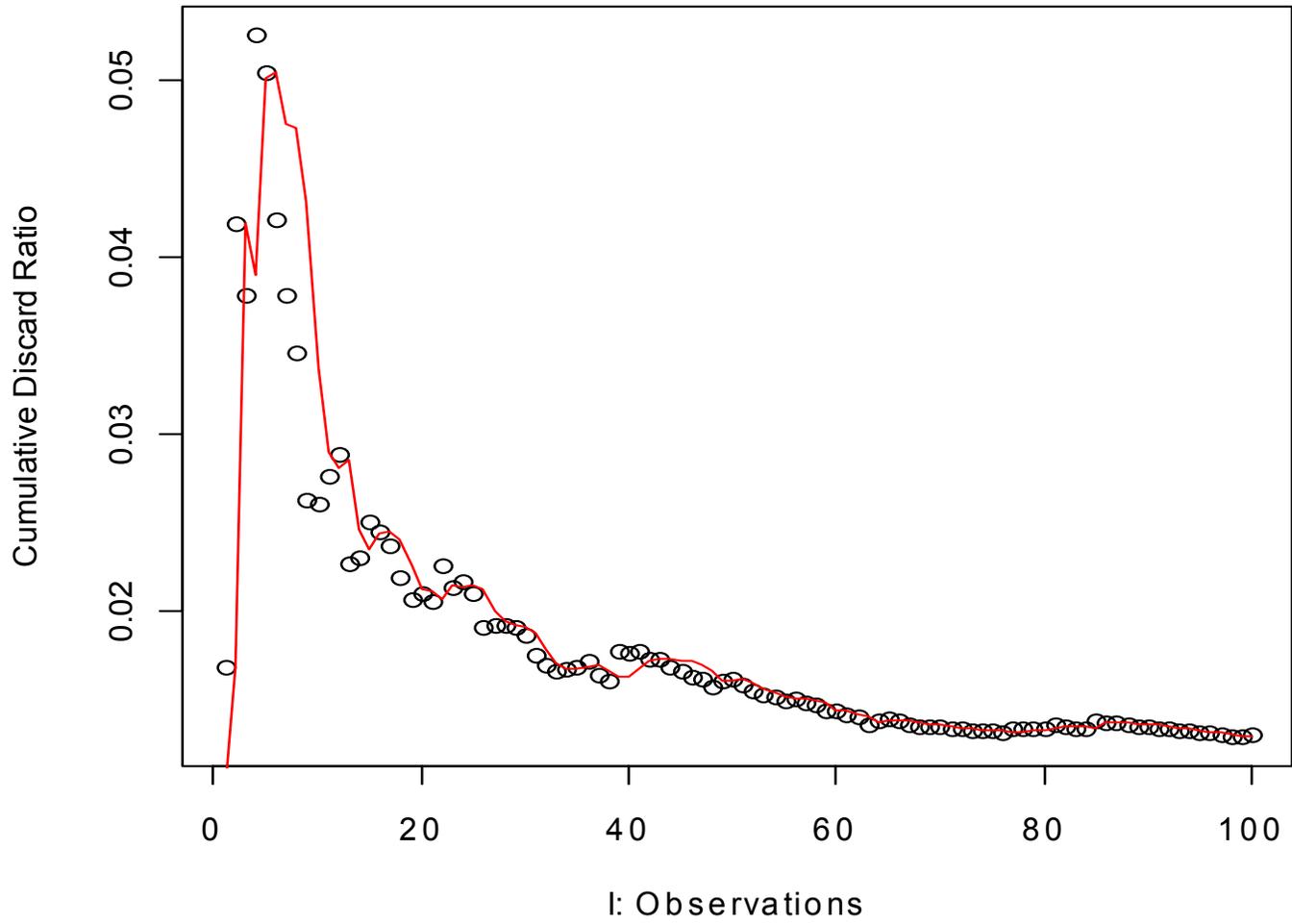
Where

- TR is the transition rate
- I is the number of observations
- α is the exponential weight
- SR is the seed rate
- i is an observation
- d is the observed discard
- kall is the observed kept-all
- I_{max} is the maximum number of observations

Adaptive Alpha: Observed YT



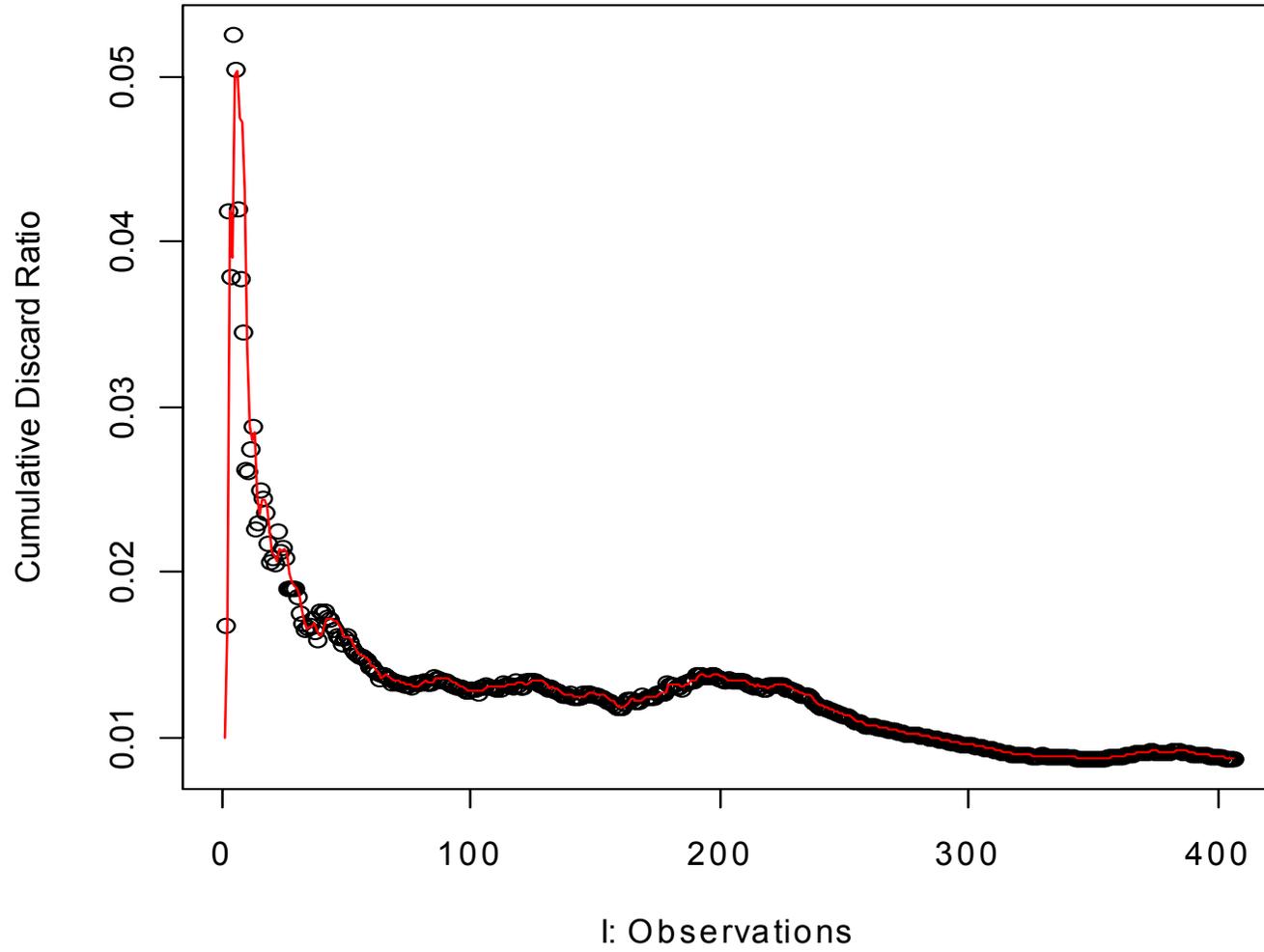
Adaptive Alpha: Observed YT



Adaptive Alpha

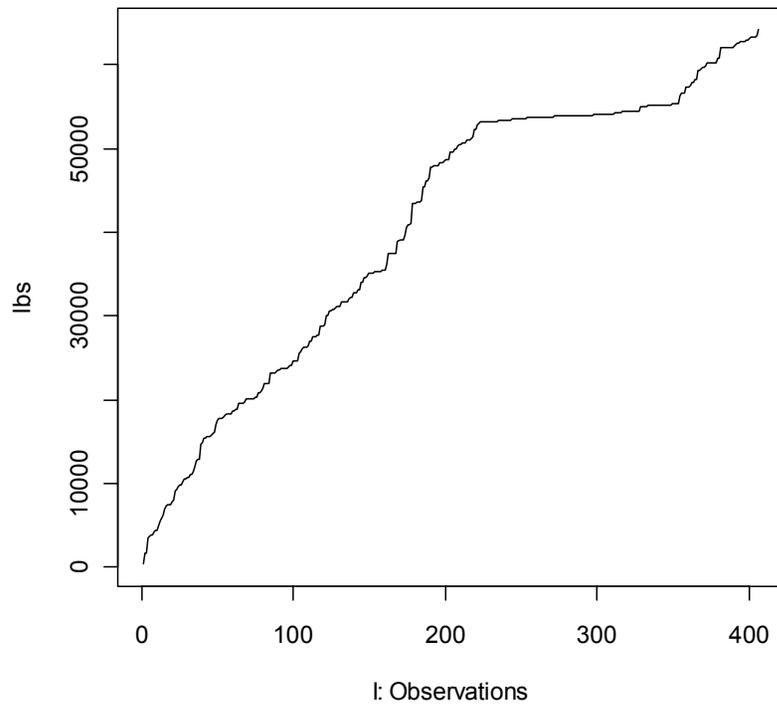
- $\text{Error}_i = (\text{Current Cumulative Ratio} - \text{Forecasted Cumulative Ratio})$
- $\text{SAD}_i = \text{Exponentially weighted error}$
 $= \beta * \text{Error}_i + (1 - \beta) * \text{SAD}_{i-1}$ (where $\beta=0.2$)
- $\text{MAD}_i = \text{Exponentially weighted absolute error}$
 $= \beta * |\text{Error}_i| + (1 - \beta) * \text{MAD}_{i-1}$ (where $\beta=0.2$)
- $\text{Alpha}_i = |\text{SAD}_i / \text{MAD}_i|$
- $\text{Forecast Cumulative Ratio}_{i+1} = \text{Forecast Cumulative Ratio}_1 + \text{Alpha}_i * \text{Error}_i$

Adaptive Alpha: Observed YT



Adaptive Alpha Behavior

Cumulative Discards



Adaptive Alpha

