

**UNCOVERING A LOCAL TREND IN CONSUMER EYE-TRACKING DATA –
APPLICATION OF SINGULAR VALUE DECOMPOSITION IN ANALYZING
GAZE SEQUENCE DATA**

Nobuyuki Fukawa, Missouri University of Science and Technology, USA¹
Yanzhi Zhang, Missouri University of Science and Technology, USA²
David W. Stewart, Loyola Marymount University, USA³
John Burkardt, Virginia Polytechnic Institute and State University, USA⁴

ABSTRACT

As visual marketing gains a more critical role in marketing communications, consumer eye-tracking data has been utilized to assess the effectiveness of those marketing efforts (Croll, 2016; Glazer, 2012). With eye-tracking data, researchers can capture consumers' visual attention effectively and may predict their behavior better than with traditional memory measures (Wedel & Pieters, 2008). However, due to the complexity of data: its volume, velocity and variety, known as 3Vs of Big Data, marketing scholars have been slow in fully utilizing eye-tracking data. These data properties may pose a challenge for researchers to analyze eye-tracking data, especially gaze sequence data, with traditional statistical approaches. Commonly, researchers may analyze gaze sequences by computing average probabilities of gaze transitions from a particular area of interest to another area of interest. When the variance of gaze sequence data in the sample is small, this method would uncover a meaningful “global” trend, a trend consistent across all the individuals. However, when the variance is large, this method may not enable researchers to understand the nature of the variance, or the “messiness” of data. In this paper, first, to overcome this challenge, we propose an innovative method of analyzing gaze sequence data. Utilizing the singular value decomposition, our proposed method enables researchers to reveal a “local” trend, a trend shared by only some individuals in the sample. Second, we illustrate the benefits of our method through analyzing gaze sequence data collected in an advertising study. Finally, we discuss the implications of our proposed method, including its capability of uncovering a hidden “local” trend in “messy” gaze sequence data.

Keywords: Big Data, eye-tracking data, gaze sequence, attention, advertisement

References Available Upon Request.

¹ fukawan@mst.edu

² zhangyanz@mst.edu

³ David.Stewart@lmu.edu

⁴ burkardt@vt.edu