The Stability of Parameter Estimation of Fuzzy Variables

Dug Hun Hong

Abstract: Recently, the parameter estimations for normal fuzzy variables in the Nahmias' sense was studied by Cai [4]. These estimates were also studied for general T-related, but not necessarily normal fuzzy variables by Hong [10] In this paper, we report on some properties of estimators that would appear to be desirable, including unbiasedness. We also consider asymptotic or "large-sample" properties of a particular type of estimator.

Keywords: duzzy variables; parameter estimation; consistency; MSE; stability of estimation;

AMS Subject Classification: 28E10; 62L12;

References

- R. Badard: The law of large numbers for fuzzy processes and the estimation problem. Inform. Sci. 28 (1982), 161–178.
- [2] K. Y. Cai, C. Y. Wen, and M. L. Zhang: Fuzzy variables as a basis for a theory of fuzzy reliability in the possibility context, Fuzzy Sets and Systems 42 (1991) 145-172.
- [3] K. Y. Cai, C. Y. Wen, and M. L. Zhang: Posbist reliability behavior of typical systems with two types of failures. Fuzzy Sets and Systems 43 (1991), 17–32.
- [4] K. Y. Cai: Parameter estimations of normal fuzzy variables. Fuzzy Sets and Systems 55 (1993), 179–185.
- [5] S. Chanas and M. Nowakowski: Single value simulation of fuzzy variable. Fuzzy Sets and Systems 25 (1988), 43–59.
- [6] H. Dishkant: About membership functions estimation. Fuzzy Sets and Systems 5 (1981) 141–147.
- [7] D. Dubois and H. Prade: Additions of interactive fuzzy numbers. IEEE Trans. Automat. Control 26 (1981), 926–936.
- [8] D. Dubois and H. Prade: Fuzzy Sets and Systems: Theory and Applications. Academic Press, New York 1980.

- [9] S. Heilpern: The expected value of a fuzzy number. Fuzzy Sets and Systems 47 (1992), 81–86.
- [10] D. H. Hong: Parameter estimations of mutually *T*-related fuzzy variables. Fuzzy Sets and Systems 123 (2001), 63–71.
- [11] D. H. Hong: A note on t-norm-based addition of fuzzy intervals. Fuzzy Sets and Systems 75 (1995), 73–76.
- [12] D. H. Hong and Hoyong Kim: A note to sum of fuzzy variables. Fuzzy Sets and Systems 93 (1998), 121–124.
- [13] D. H. Hong and P. I. Ro: The law of large numbers for fuzzy numbers with unbounded supports. Fuzzy Sets and Systems 116 (2000), 269–274.
- [14] D. H. Hong and C. Hwang: T-sum bound of LR-fuzzy numbers. Fuzzy Sets and Systems 91 (1997), 239–252.
- [15] D. H. Hong and J. Lee: On the law of large numbers for mutually *T*-related *L-R* fuzzy numbers. Fuzzy Sets and Systems 116 (2000), 263–269.
- [16] A. Marková: T-sum of LR-fuzzy numbers. Fuzzy Sets and Systems 85 (1996), 379–384.
- [17] R. Mesiar: Triangular norm-based additions of fuzzy intervals. Fuzzy Sets and Systems 91 (1997), 231–237.
- [18] S. Nahmias: Fuzzy variables. Fuzzy Sets and Systems 1 (1978), 97–110.
- [19] H. T. Nguyen: A note on the extension principle for fuzzy sets. J. Math. Anal. Appl. 64 (1978), 369–380.
- [20] M. B. Rao and A. Rashed: Some comments on fuzzy variables. Fuzzy Sets and Systems 6 (1981), 285–292.
- [21] B. Schweizer and A. Sklar: Probabilistic Metric Space. North-Holland, New York 1983.
- [22] P.Z. Wang: Fuzzy Set Theory and Its Applications. Shanghai Publishing House of Science and Technology, Shanghai 1983.
- [23] L.A. Zadeh: Fuzzy Sets as a basis for a theory of possibility. Fuzzy Sets and Systems 1 (1978), 3–28.