Accepted Manuscript

Central limit theorems for bounded random variables under belief measures

Xiaomin Shi

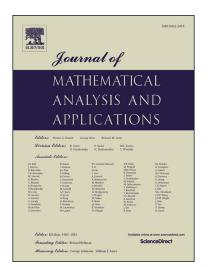
 PII:
 S0022-247X(17)31020-X

 DOI:
 https://doi.org/10.1016/j.jmaa.2017.11.019

 Reference:
 YJMAA 21818

To appear in: Journal of Mathematical Analysis and Applications

Received date: 19 May 2016



Please cite this article in press as: X. Shi, Central limit theorems for bounded random variables under belief measures, *J. Math. Anal. Appl.* (2018), https://doi.org/10.1016/j.jmaa.2017.11.019

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Central limit theorems for bounded random variables under belief measures

Xiaomin Shi*

Abstract. Recently a new type of central limit theorem for belief functions was given in Epstein et al. [9]. In this paper, we generalize the central limit theorem in Epstein et al. [9] to accommodate general bounded random variables. These results are natural extension of the classical central limit theory for additive probability measures.

Key words. central limit theorem, belief measure, non-additive measure

1 Introduction

Recently, a central limit theorem (CLT for short) for belief functions was given in Epstein et al. [9] (Theorem 3.1) to construct suitably robust confidence regions for incomplete models. We state their CLT for the readers' convenience:

Theorem 1.1 Let $\Lambda_{\theta_n} \to \Lambda \in \mathbb{R}^{J \cdot J}$ and $c_n \to c \in \mathbb{R}^J$. Then

$$\nu_{\theta_n}^{\infty}(\cap_{j=1}^J \{s^{\infty} : \sqrt{n}[\nu_{\theta_n}(A_j) - \Psi_n(s^{\infty})(A_j)] \le c_{nj}\}) \to \mathbf{N}_J(c;\Lambda).$$
(1.1)

In the theorem above, structure parameter θ and J = 1, 2,... be fixed a prior. S is a finite state space, and $A_1, ..., A_J$ are J subsets of S. $\Psi_n(s^{\infty})(A_j) = \frac{1}{n} \sum_{i=1}^n I_{\{s_i \in A_j\}}, \ j = 1, ..., J$ are the empirical frequency measure of A_j in the first n experiments along the sample $s^{\infty} = (s_1, s_2, ...)$.

$$cov_{\theta}(A_i, A_j) = \nu_{\theta}(A_i \cap A_j) - \nu_{\theta}(A_i)\nu_{\theta}(A_j).$$
(1.2)

 Λ_{θ} is the $J \times J$ symmetric and positive semidefinite matrix $(cov_{\theta}(A_i, A_j))$ and ν_{θ} is a belief function on S.

$$\mathbf{N}_J(c;\Lambda) = P(\xi \le c),$$

where ξ is a *J*-dimensional normal random variable with zero mean and covariance matrix Λ and relation $\xi \leq c$ is in the vector sense.

^{*}School of Mathematics and Quantitative Economics, Shandong University of Finance and Economics, Jinan 250014, China and Zhongtai Securities Institute for Financial Studies, Shandong University, Jinan, 250100, PR China. Email: shixm@mail.sdu.edu.cn. This work was supported by National Natural Science Foundation of China (No. 11401091).

Download English Version:

https://daneshyari.com/en/article/8899991

Download Persian Version:

https://daneshyari.com/article/8899991

Daneshyari.com