

Ye, Kenny Q.; Li, William; Sudjianto, Agus

Algorithmic construction of optimal symmetric Latin hypercube designs. (English)

Zbl 1109.62329

J. Stat. Plann. Inference 90, No. 1, 145-159 (2000).

Summary: We propose symmetric Latin hypercubes for designs of computer experiments. The goal is to offer a compromise between computing effort and design optimality. The proposed class of designs has some advantages over the regular Latin hypercube design with respect to criteria such as entropy and the minimum intersite distance. An exchange algorithm is proposed for constructing optimal symmetric Latin hypercube designs. This algorithm is compared with two existing algorithms of Park and Morris and Mitchell. Some examples, including a real case study in the automotive industry, are used to illustrate the performance of the new designs and the algorithms.

MSC:

62K05 Optimal statistical designs

65C60 Computational problems in statistics (MSC2010)

Cited in **39** Documents

Keywords:

Computer experiment; Maximum entropy design; Maximin design

Full Text: DOI

References:

- [1] Bates, R.A.; Buck, R.J.; Riccomagno, E.; Wynn, H.P., Experimental design and observation for large systems, J. roy. statist. soc. ser. B, 58, 77-94, (1996) · Zbl 0850.62627
- [2] Currin, C.; Mitchell, T.; Morris, D.; Ylvisaker, D., Bayesian prediction of deterministic functions, with applications to the design and analysis of computer experiments, J. amer. statist. assoc., 86, 953-963, (1991)
- [3] Fang, K.-T.; Wang, Y., Number-theoretic methods in statistics, (1994), Chapman & Hall London
- [4] Johnson, M.; Moore, L.; Ylvisaker, D., Minimax and maximin distance designs, J. statist. plann. inference, 26, 131-148, (1990)
- [5] Koehler, J.; Owen, A., Computer experiments., (), 261-308 · Zbl 0919.62089
- [6] Li, W.; Wu, C.F.J., Columnwise-pairwise algorithms with applications to the construction of supersaturated designs, Technometrics, 39, 171-179, (1997) · Zbl 0889.62066
- [7] Li, W.; Wu, C.F.J., An intergrated method of parameter design and tolerance design, Quality eng., 11, 417-425, (1999)
- [8] McKay, M.; Beckman, R.; Conover, W., A comparison of three methods for selecting values of input variables in the analysis of output from a computer code, Technometrics, 21, 239-246, (1979) · Zbl 0415.62011
- [9] Mori, T., 1985. Case Studies in Experimental Design, Management System Research Laboratory, Tokyo (in Japanese).
- [10] Morris, M.; Mitchell, T., Exploratory design for computer experiments, J. statist. plann. inference, 43, 381-402, (1995) · Zbl 0813.62065
- [11] Owen, A., Orthogonal arrays for computer experiments, integration, and visualization, Statist. sinica, 2, 439-452, (1992) · Zbl 0822.62064
- [12] Park, J.-S., Optimal Latin-hypercube designs for computer experiments, J. statist. plann. inference, 39, 95-111, (1994) · Zbl 0803.62067
- [13] Sacks, J.; Schiller, S.B.; Welch, W.J., Designs for computer experiments, Technometrics, 34, 15-25, (1989)
- [14] Shewry, M.; Wynn, H., Maximum entropy design, J. appl. statist., 14, 2, 165-170, (1987)
- [15] Shoemaker, A.C.; Tsui, L.L.; Wu, C.F.J., Economical experimentation methods for robust design, Technometrics, 33, 415-427, (1991)
- [16] Tang, B., Orthogonal array-based Latin hypercubes, J. amer. statist. assoc., 88, 1392-1397, (1993) · Zbl 0792.62066
- [17] Welch, W.J.; Yu, T.K.; Kang, S.M.; Sacks, J., Computer experiments for quality control by parameter design, J. quality technol., 22, 15-22, (1990)
- [18] Ye, K.Q., Column orthogonal Latin hypercubes and their application in computer experiments, J. amer. statist. assoc., 93, 1430-1439, (1998) · Zbl 1064.62553

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically

matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.