Shen, Haipeng; **Huang, Jianhua Z.**
Analysis of call centre arrival data using singular value decomposition. (English)
Zbl 1089.62155

Data of the number of calls arriving to a call centre during a year (in 2002) are considered. A 17-h operating period is divided into 408 150-s intervals and the data is the matrix $X = (x_{ij})$, where x_{ij} is the number of calls during the j-th time period of the i-th day. A singular value decomposition of X is used for the dimension reduction, i.e., $X = \sum_{k=1}^{r} s_k u_k v_k^T$, where r is the rank of X, s_k are the singular numbers, u_k are the left singular vectors (inter-day feature vectors), and v_k are the right singular vectors (intra-day feature vectors). The use of s_k, u_k and v_k is analogous to the use of eigenvalues and eigenvectors in principal component analysis. The authors use them for cluster analysis of the days and description of the patterns of call number changes during a day. A forecast for the number of calls is proposed based on the first singular vector decomposition: $x_{ij} = s_1 u_{1,i} v_{1,j} + \varepsilon_{ij}$, where ε_{ij} are approximation errors, and $u_{1,i}$ follow an AR(1) model with varying coefficients: $u_{1,i} = a(d_{i-1}) + b(d_{i-1})u_{1,(i-1)} + \varepsilon_i$, d_i being the factor denoting the day-of-week for the i-th day.

Reviewer: R. E. Maiboroda (Kyïv)

MSC:

62P99	Applications of statistics
62H30	Classification and discrimination; cluster analysis (statistical aspects)
62H25	Factor analysis and principal components; correspondence analysis
62P30	Applications of statistics in engineering and industry; control charts
90B99	Operations research and management science

Cited in **10** Documents

Keywords:

anomaly detection; data reduction; forecasting call volume; principal components

Full Text: DOI

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