

**BIVARIATE NATURAL EXPONENTIAL FAMILIES WITH LINEAR
DIAGONAL VARIANCE FUNCTIONS**

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Abstract: It is well known that natural exponential families (NEFs) are uniquely determined by their variance functions (VFs). However, there exist examples showing that even an incomplete knowledge of a matrix VF can be sufficient to determine a multivariate NEF. Following such an idea, in this paper a complete description of bivariate NEFs with linear diagonal of the matrix VF is given. As a result we obtain the families of distributions with marginals that are some combinations of Poisson and normal distributions. Furthermore, the characterization extends (in two-dimensional case) the classification of NEFs with linear matrix VF obtained by Letac [11]. The main result is formulated in terms of regression properties.

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