INFERENCES BASED ON A BIVARIATE DISTRIBUTION WITH VON MISES MARGINALS

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Abstract. There is very little literature concerning modeling the correlation between paired angular observations. We propose a bivariate model with von Mises marginal distributions. An algorithm for generating bivariate angles from this von Mises distribution is given. Maximum likelihood estimation is then addressed. We also develop a likelihood ratio test for independence in paired circular data. Application of the procedures to paired wind directions is illustrated. Employing simulation, using the proposed model, we compare the power of the likelihood ratio test with six existing tests of independence.

Key words and phrases: Angular observations, maximum likelihood estimation, models of dependence, power, testing.