Handling Outlier in Two-Ways Table by Robust Alternating Regression of FANOVA Models: Towards Robust AMMI Models

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ABSTRACT

AMMI (Additive Main Effect Multiplicative Interaction) model for interactions in two-way table provide the major mean for studying stability and adaptability through genotype × environment interaction (GEI), which modeled by full interaction model. Eligibility of AMMI model depends on that assumption of normally independent distributed error with a constant variance. Nowadays, AMMI models have been developed for any condition of MET data which violence the normality, homogeneity assumpion. We can mention in this class of modelling as M-AMMI for mixed AMMI models, G-AMMI for generalized AMMI models. The G-AMMI was handling non-normality i.e categorical response variables using an algorithm of alternating regression. While in handling the non-homogeneity in mix-models sense, one may use a model called factor analytic multiplicative. The development of AMMI models is also to handle any outlier that might be found coincides with non-homogeneity condition of the data. In this paper, we will present of handling outlier in multplicative model by robust approach of alternating regression algorithm.

Keywords: AMMI, G-AMMI, M-AMMI, factor analytic, multiplicative models, alternating regression, robust approach

INTRODUCTION

AMMI (Additive Main Effects and Multiplicative Interaction Analysis) was well described by Gauch (1988, 1992) and Gollob (1968). AMMI may be viewed as a procedure to separate pattern (the G x E interaction) from noise (mean error of treatment mean within trials). This is achieved by PCA, where the first axes (i.e. the axes with the largest eigenvalues) recover most of the pattern, whilst most of the noise ends up in later axes. The pattern can be viewed as the whole G × E effects weighed by an estimate of the pattern-to-noise ratio associated with the respective effect. This pattern-to-noise ratio is a variance component ratio analogue to a repeatability or heritability coefficient (Piepho 1994). Multiplicative models AMMI have been popularised in a fixed model context and a number of applications have been found (Gauch 1988, 1992, Crossa *et al*. 1990). AMMI analysis combines, in a model, additive components for main effects (treatments and environments) and multiplicative components for G × E effects.

AMMI model combines a univariate technique, ANOVA for the main effects and a multivariate technique PCA-principal component analysis, for G × E effects. Crossa (1990) suggests that the use of multivariate techniques permits a better use of information than the traditional regression methods. This models are also give a visually pattern of the main interaction through biplot. The power of multiplicative AMMI model is placed on visualized interactions by using biplot.

The AMMI model represents observations into a systematic component that consists of main effect and interaction effect through multiplication of interactions components, apart from random errors component. Basically, the AMMI analysis combines both additive analysis of variance for the main effect of treatment and analysis of multiple main components uses bilinear modeling for the interaction effect, by using singular value decomposition (SVD) of its interaction matrix (Mattjik & Sumertajaya 2000, Mattjik 2005). Eligibility of AMMI model depends on that assumption of normally independent distributed error with a constant variance. Nowadays, AMMI models have been developed for any condition of MET data which is violences in i.e the normality and homegeneity assumpion. We can mention in this class of medelling as M-AMMI for mixed AMMI models, G-AMMI for generalized AMMI models. The G-AMMI was handling non-normality i.e categorical response variables using an algorithm of alternating regression (Eeuwijk 1995). The G-AMMI with normal data distributited and indentity link function is equal to AMMI models. Some aplications of generalized alternating