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## Integrating model-based clustering and graphical models to explore the relationship with the digital self-image in (pre)adolescents

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Digital revolution has dramatically changed not only the way people interact but also the relationship with the self-image. Increased data availability and computational power have significantly improved algorithms for facial feature detection which have been also successfully applied to develop face filter apps enhancing and “beautifying” self-portraits. Potential of these filters in altering facial appearance has raised concerns in parents, educators and health professionals as they promote unrealistic beauty standards increasing discrepancy between real and digital self. Actually taking, sharing and viewing edited selfies may have detrimental effects especially on younger users in a developmental phase where they are already facing significant identity construction processes, possibly giving rise to appearance-related cyberbullying. To investigate selfie-sharing/editing behaviour in (pre)adolescents, their relationship with digital self-image, problematic use of social network and possible internalizing symptoms an online questionnaire, including both validated and ad-hoc realized scales, has been developed. When examining the digital-self image, here the attention is narrowed to the face only, the protagonist of real and virtual interactions, and not to the whole body. In this setting, graphical models represent an appealing tool to model dependence structure between collected variables. To properly analyze collected data, the procedure should account for the fact that (i) data from psychological questionnaires are usually measured on discrete/ordinal levels thus violating the normality assumption and (ii) measured behaviors are rarely homogeneous and this heterogeneity should be properly modelled to obtain unbiased results. To tackle these issues, an approach integrating model-based clustering and graphical models (Fop et al., 2019), has been applied to copula transformed data collected on a sample of 229 middle school (pre)adolescents which took part to the online survey. A two-clusters solution was selected as best based on BIC criterion: the two clusters actually showed different covariance network and different management of online self-image and psychological status. Participants in the cluster displaying a worse management of online self-image and psychological status were mainly female reporting higher use of social networks. To better examine the relationships among variables within each cluster, partial correlation networks were estimated separately for the two clusters and compared using both global and local network statistics and inferential procedure for network comparison. Although graphical models have been widely used to model psychological phenomena as complex networks, the application to selfie behavior is original. Moreover, identifying clusters within a graphical model framework has important practical implications such as (i) aiding in the development of tailored training programs suited for improving digital wellbeing in younger users and (ii) uncovering new data-driven relationships among constructs thus generating new hypothesis to test in successive studies.

Reference Fop, M., Murphy, T.B. and Scrucca, L., 2019. Model-based clustering with sparse covariance matrices. *Statistics and Computing*, 29(4), pp.791-819. Kashiwara, J., Takebayashi, Y., Kunisato, Y. and Ito, M. (2021). Classifying patients with depressive and anxiety disorders according to symptom network structures: A Gaussian graphical mixture model-based clustering. *Plos one*, 16(9), p.e0256902.

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