

A multivariate Bayesian model for human growth

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Abstract:

It is important to have good models of human growth. For example, having a good reference of normal growth during pregnancy, can help in deciding whether and when an obstetrical intervention is needed. More generally, abnormal growth patterns can be an indication for diseases later in life. While multivariate growth models exist, in practice growth is usually modeled one dimension at a time. The 'SuperImposition by Translation And Rotation' model (SITAR) by Cole (2010) is very suitable to model human growth univariately. The idea of this model is that all individual growth profiles can be reduced to an average growth curve by translating them horizontally and vertically and by stretching them. Mathematically the average profile is modeled by a restricted cubic spline and the amount of translating and stretching is modeled by subject specific effects. Because we are also interested in the relationship between the outcomes we extended the model to incorporate multiple outcomes by assuming that the subject specific effects of the various outcomes are generated by a single multivariate normal distribution. To illustrate our developments, we use data from the Predict study in which fetal growth in the first trimester of pregnancy is studied.

References

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