

Estimating the risk of a Down's syndrome term pregnancy: comparison of various methods

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The purpose of this study is to estimate the risk of a Down's syndrome pregnancy given the maternal age and levels of certain biochemical markers, namely α -fetoprotein (AFP), human chorionic gonadotrophin (hCG) and gravidity specific β 1-glicoprotein (SP1). We remark, that SP1 is used for this purpose for the first time. The classical method is based on discriminant analysis (see. e.g. [1]) but recently the logistic regression is also applied for classification of the data [2]. An improvement of the estimates of the parameters of the normal distribution is possible using EM algorithm.

In the present work we compare the performance of the two methods using a dataset containing the data of almost 90.000 unaffected and 333 affected pregnancies from the eastern part of Hungary. We also calculate the theoretical detection and false positivity rates for both methods under the usual assumption of lognormality of the marker values.

References

- [1] Cuckle, H. S., Wald, N. J., Thompson, S. G., Estimating a woman's risk of having a pregnancy associated with Down's syndrome using her age and serum alpha-fetoprotein level. *Br. J. Obstet. Gynaecol.* **94** (1987), 387–402.
- [2] Hwa,H-L., Ko, T-M., Hsieh, F-J., Yen, M-F., Chou, K-P., Chen, T. H-H., Risk prediction for Down's syndrome in young pregnant women using maternal serum biomarkers: determination of cut-off risk from receiver operating characteristic curve analysis. *J. Eval. Clin. Pract.* **13** (2007), 257-258.