

Seminář  
Oddělení medicínské informatiky a biostatistiky  
ÚI AV ČR, v. v. i.

V pátek 20. června 2014 od 10:00 je na programu přednáška

## **Estimation of proportions by inverse binomial group testing,**

kterou prosloví

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Místo konání:

Ústav informatiky AV ČR, Pod vodárenskou věží 2, Praha 8 (metro C Ládví),  
místnost 222 (1. posch.).

Zájemci jsou srdečně zváni.

### **Abstract**

Group testing (or pooled testing) arises when units from a population are pooled together and tested as a group for the presence of an attribute, usually a disease. It has been applied to fields such as blood testing, plant disease assessment, genetics, fisheries, and transmission of viruses by insect vectors. The purpose of group testing is either to identify the positive units in the groups tested, or (the focus of the lecture) to estimate the proportion ( $p$ ) of positive units in the population. Considerable cost savings can be attained if  $p$  is small.

Most research on group testing has assumed a binomial model, in which the number of groups is fixed. However, there are some situations where it would be useful to employ inverse sampling, and stop the testing process when a fixed number of positive groups has been observed. An example of where this could be adopted is the monitoring of a disease outbreak following a natural disaster. When equal group sizes are used, a negative binomial model results.

We consider point and interval estimation of  $p$  in this context. The MLE of  $p$  is severely biased, but a bias correction based on the Fisher information works very well for small  $p$ . We propose two confidence interval methods which have excellent coverage properties. One is a score-based method with a correction for skewness, and the other is an exact method with a mid- $P$  correction. Calculations are complicated by the infinite number of outcomes under the negative binomial model.