Homework

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Introduction

TODO(Mathieu): Reduced version

Outcome categorization

The binary response was related with a cow being healthy or unhealthy. Taking this into considertation, the outcome was categorized using the following criteria:

- Literature review*: A healthy cow is estimated to have a PCV value ranging from 24 to 46.
- Practical Modeling: As the binary response should be modeled in following sections, a suitable one was searched. To this end, a trial and error with a cutoff ranging from 20 to 24 was explored.

The threshold between healthy and unhelathy cow was set at a PCV value of 20. If the PCV value was bigger it was categorized as healthy, if it was lower or equal it was cathegorized as unhelathy.

TODO(Mathieu): Improve text TODO(Gerard): Table to LaTeX. (You can remove Missing row if you want)

% latex table generated in R 3.1.2 by xtable 1.7-4 package % Fri May 08 11:07:46 2015

Statistical methods

The methods used in the statistical analyses are detailed in this section. First a Generalized Estimating Equations and latter a Generalized Linear Mixed Model. An exploratory data analysis was performed before those regression methods.

GEE

The response variable was the cathegorized PCV to detect healthy and unhelathy cows. As we wanted to estimate the effect of dose in healthy/unhelathy cows in time, these two variables were included in the model.

From this initial model, a forward step-wise method was carried for the model selection, including additional covariates or interactions between them. The models were compared quasilikelihood ratio test when nested and with QuasiLikelihood Information Criteria (Pan 2001) when non-nested.

GLMM

TODO(Mathieu)

Transition Models

TODO(Lluis): Add model information. TODO(All): Include pros/cons with our data. Decide if our data could be modeled using this kinds of models.

Results

GEE

TODO(Lluis)

Random effects model

TODO(Mathieu)

Missing Data Analysis

TODO(Gerard): Missing exploration

Limitations and Further research

- Jacknife estimators for small sample better than sandwhich estimator

  Jackknife variance estimators are preferable to the sandwich estimator in case of a small number of clusters. (Højsgaard, Halekoh, Yan 2006)

- Compre a new factor L and M dose against H dose
- Perfect Separation Problem with gee

  It apeared when using a 22 PCV value threshold for healthy or unhealthy cow.

- Compare GEE model with GLMM. Coeficients and SE.

Bibliography

TODO(Gerard): Normalize citations

- Pan 2001, Biometrics, Akaike's Information Criterion in Generalized Estimating Equations.
- Højsgaard, Halekoh, Yan 2006, The R Package geepack for Generalized Estimating Equations.
- Hardin & Hilbe 2002, Generalized Estimating Equations

	Time 1	Time 2	Time 3
Unhealthy	28	15	2
Healthy	1	12	18
NA	1	3	10

Table 1: Contingence table for the dichotomised response variable (rows) and the times.