BSc thesis

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### Topic: On-Line Computation of Up-To-Date Summaries of Nutrient Measurements in the Swiss Feed Database

The Swiss Feed Database stores the history of nutrient measurements for more than 600 feed types and 155 nutrients. The most recent measurements characterize the current quality of an animal feed. Typically, the selected measurements of the last year or shorter time period are aggregated into up-to-date summaries and, then, are provided to companies, private farmers or research institutions. The up-to-date summaries are critical for planning healthy, effective and cheap animal feed.

The main question that arises in the computation of up-to-date summaries is how to select the time period and relevant measurements for the aggregation. Measurements exhibit a number of unique properties that makes answering this question an interesting challenge. Firstly, measurements are often not single-valued but sets of values. Secondly, measurements are sparse in time: they are taken irregularly in order to reduce the analyses cost. Therefore, the choice of the time period and measurements for the aggregation is data driven and depends on the number and quality of collected measurements.

This thesis aims to develop a scalable solution for on-line computation of up-to-date summaries. The major part of the work is dedicated for integration of the developed solution into the Swiss Feed Database. That involves extending the database to support the history of up-to-date summaries and design of SQL queries that automatically refine up-to-date summaries as new measurements are available.

This thesis is to be completed in close collaboration with research authorities of Agroscope, including one-day or long stay visits to the agriculture research institute in Posieux.

Tasks:

1. Identification of parameters and events in the history of nutrient measurements that influence computation up-to-date summaries.
2. Development of an algorithm to compute up-to-date summaries.
3. Design and implementation of an extension to the Swiss Feed Database that supports the history of up-to-date summaries.
4. Write a bachelor thesis presenting your results.
5. Presentation of the results (15 minutes).

Literature:

- Peter Pin-Shan Chen. The entity-relationship model - toward a unified view of data. 1976.
- H. Gregersen and C. S. Jensen. Conceptual Modeling of Time-Varying Information. 1998.
- A. Tansel, J. Clifford, S. Gadia, S. Jajodia, A. Segev, and R. T. Snodgrass. Temporal Databases: Theory, Design, and Implementation. Benjamin/Cummings Publishing Company, 1993.
- A. Gupta and I. S. Mumick. Maintenance of materialized views: problems, techniques, and applications. MIT Press, Cambridge, MA, 1999.

Task assignment and Supervisor:

- Andrej Taliun

Starting date: To be determined

Ending date: To be determined

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