University of Zurich UZH

Department of Informatics

University of Zürich
Department of Informatics
Binzmühlestr. 14
CH-8050 Zürich
Phone. +41 44 635 43 11
Fax +41 44 635 68 09
www.ifi.uzh.ch/dbtg

UZH, Dept. of Informatics, Binzmühlestr. 14, CH-8050 Zürich

Andrin Betschart

Prof. Dr. Michael Böhlen
Professor
Phone +41 44 635 43 33
Fax +41 44 635 68 09
boehlen@ifi.uzh.ch

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Bachelorarbeit in Informatik
Datenbanktechnologie

Topic: Visualization of the Varying Spatial Density Information in the Swiss Feed Database

The core of the Swiss Feed Database are measurements of nutrients from feed samples that are collected across the Switzerland. The current on-line interface to query the feed data graphically illustrates feed samples with flags on the map and for each feed sample the containment of nutrient is given as a text in the list. There are two essential drawbacks while visualizing feed samples with flags. First, in case then there are many feed samples from the same location, all of them are visualized by a single flag and, therefore, it is hard for the user to compare different locations based on the number of feed samples. Second, flags do not reveal the information about the containment of the selected nutrients and, thus, it is not possible to visually compare the feed quality across different locations.

The goal of this Bachelor thesis is to enrich visualization of the query results with color plots which with different palettes color the map to show the density of the collected feed samples and content of the selected nutrients. In case, if a query result consists of samples that are collected at different times, the new visualization must provide an animation from multiple color plots. In our work we will use the Kernel Density estimation techniques for the computation of the continuous density function. The Kernel Density is an accurate, however, computationally expensive method that has quadratic complexity. The primary goal of the student is optimization of the kernel density estimation for the feed data so that the system is capable in a real-time to produce the required color plots.

This thesis is to be completed in close collaboration with research authorities of Agroscope, including possible visits to the agriculture research institute in Posieux.

Deliverables:

1. Implementation and integration of the color plots with zooming into on-line application of the Swiss Feed Database.

2. Bachelor thesis presenting your results.

3. Presentation of the results (15 minutes).

Literature:

- Härdle, Müller, Sperlich, Werwarz (1995). Nonparametric and Semiparametric Models. Springer, Berlin.

- Scott, D.W. (1992). Multivariate Density Estimation: Theory, Practice, and Visualization. John Wiley & Sons, New York.

- Silverman, B.W. (1986).Density Estimation for Statistics and Data Analysis. Chapman and Hall, London.

Supervisor:

- Andrej Taliun

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Department of Informatics, University of Zurich

Prof. Dr. Michael Böhlen