Monitoring of Farrowing Patterns in Pigs using Radar Sensor Data

Background
The intensive pig production industry faces significant challenges in maintaining optimal farrowing processes to ensure the health and welfare of sows and piglets. The duration of piglet and placental expulsion during farrowing has a substantial impact on piglet survival rates, animal welfare, and overall reproductive performance. With the increase in litter sizes, prolonged farrowing durations have become a concern, leading to various postpartum issues and economic losses. Existing monitoring techniques lack real-time and continuous insights into the farrowing process. This research aims to address this gap by harnessing radar sensor data to provide non-invasive and real-time information about sow behaviour during parturition. By accurately detecting and analysing farrowing patterns, the goal is to develop an innovative monitoring system that can promptly identify anomalies or disorders, enabling timely intervention and improving the overall health and well-being of both sows and piglets.

Aim
The aim of this study is to develop an advanced monitoring system that utilizes radar sensor data to continuously and non-invasively track farrowing patterns in sows, enabling the early detection of birth problems and therefore, contributing to enhanced animal welfare and reproductive performance.

Materials and Methods
For this project, the student will utilize datasets previously collected from farrowing sows in a controlled farm setting. The data will be cleaned and pre-processed to remove noise and artifacts. The student will explore signal and image processing techniques that can be applied to process radar data, e.g., 3D points with corresponding velocity information (point cloud) and range-doppler maps. Then, the student will design a workflow to identify farrowing patterns, i.e., the time of farrowing and the delivery intervals between piglets with the help of radar signals. Lastly, Machine learning techniques, including supervised pattern recognition models, will be employed to analyse the data and develop an alert system capable of identifying abnormal farrowing patterns.

Nature of the Thesis:
- Literature research: 10%
- Experimental: 10%
- Data and image processing and programming: 70%
- Documentation: 10%

Requirements:
- Motivation to work in a multidisciplinary team
- Programming skills in python for data processing and AI

Supervisors:
Prof. Dr. Lilian Witthauer
PD Dr. med. vet. Alexander Grahofer

Institutes:
Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism, Schweineklink, Departement für klinische Veterinärmedizin

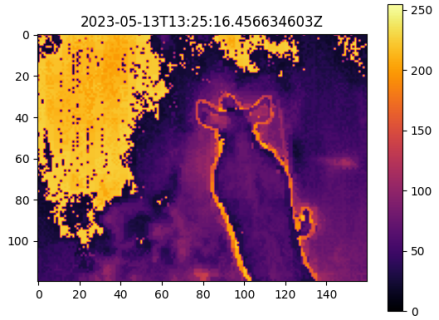

Fig. Thermal camera image of farrowing pig.

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