Software Requirements Specification for SFWRENG 4G06: subtitle describing software

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Revision History

Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

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6 The Scope of the Work

6.1 The Current Situation

The current state of dairy farming presents challenges in efficiently predicting the health, productivity, and breeding outcomes of cattle. Farmers typically rely on historical records, but the analysis is done manually, often leading to reactive management. The existing systems do not utilize advanced technologies such as machine learning for predictive analytics. As a result, there is limited proactive management regarding milk production, breeding success, and herd longevity, which directly impacts farm profitability and sustainability.

The current solution environment lacks integration of large datasets from multiple sources, such as individual cow health records, breeding history, and environmental conditions, into a single system that can offer actionable predictions.

6.2 The Context of the Work

This project aims to develop a machine learning model that will leverage historical herd data to predict important traits such as milk yield, breeding success rates, and the likelihood of a cow leaving the herd. This model will be integrated into a farm management system, providing farmers with actionable insights. The goal is to move from reactive to proactive herd management.

The model will use data such as the health, breed, and genetic history of both the mother and father to predict traits in calves. The software will be developed as part of a partnership with CATTLEytics Inc., ensuring seamless integration into their existing platform used by dairy farmers.

6.3 Work Partitioning

The project will be divided into several key components:

1. **Data Collection and Preprocessing:**
    - Collection of historical data from existing systems, including cow health records, breeding data, and productivity metrics.
    - Cleaning and standardizing the data for input into the machine learning model.
2. **Model Development:**
    - Designing and implementing the machine learning model for trait prediction (e.g., milk production, herd retention).
    - Training and validating the model on historical datasets.
    - Iterative testing and refinement.
3. **Integration:**

- Integrating the prediction model into the CATTLEytics farm management system.
- Ensuring that outputs are presented in a user-friendly format for farmers to make decisions.

4. **Testing and Validation:**
    - Testing the software in real-world farm environments to validate predictions and refine the user interface.
5. **Documentation and Training:**
    - Providing clear documentation for users and training for farmers to effectively use the system.

6.4 Specifying a Business Use Case (BUC)

6.5 Specifying a Business Use Case (BUC)

Title: Predicting Cow Traits for Optimized Herd Management

Primary Actor: Dairy farmer using the CATTLEytics system.

Precondition: The farmer has access to a herd management system integrated with the prediction model. Historical data on breeding, milk production, and herd turnover are available.

Trigger: The farmer initiates the model to predict the outcomes of a planned breeding or evaluates the likelihood of an existing cow leaving the herd.

Main Success Scenario:

1. The farmer selects cows for breeding and inputs the necessary data (e.g., parent traits).
2. The system processes the input and returns predictions for milk yield and herd retention likelihood.
3. Based on the model's predictions, the farmer makes informed decisions on breeding strategies or management actions to prevent herd loss.

Postconditions:

- The farmer has actionable insights to improve herd productivity and manage herd turnover proactively.

7 Business Data Model and Data Dictionary

7.1 Business Data Model

This section will be completed once the relevant data model details are available.

7.2 Data Dictionary

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Appendix — Reflection

The information in this section will be used to evaluate the team members on the graduate attribute of Lifelong Learning. Please answer the following questions:

1. What knowledge and skills will the team collectively need to acquire to successfully complete this capstone project? Examples of possible knowledge to acquire include domain specific knowledge from the domain of your application, or software engineering knowledge, mechatronics knowledge or computer science knowledge. Skills may be related to technology, or writing, or presentation, or team management, etc. You should look to identify at least one item for each team member.

2. For each of the knowledge areas and skills identified in the previous question, what are at least two approaches to acquiring the knowledge or mastering the skill? Of the identified approaches, which will each team member pursue, and why did they make this choice?