Revolutionising Livestock Management: Computer Vision for Cattle Behaviour Recognition

Misbah Ahmad is a PhD student at Hartpury University studying the use of computer vision to determine animal emotion through activity recognition. The data was funded by the Douglas Bomford Trust, an AFCP member.

Farmers, advisers, farming press, and charity executives! Today, we are diving into an exciting topic transforming how we manage our cattle and improve their well-being. Imagine having eyes on your herd 24/7 without being physically present. Thanks to the incredible advancements in computer vision, this is now a reality! Computer vision software and camera surveillance transform livestock management and activity detection tasks, allowing us to understand better our animals and make more informed decisions.

Understanding Computer Vision

Before diving into the details, let us unravel the concept of computer vision. In its essence, it equips machines with the gift of sight. By enabling machines to analyse and interpret visual data like images and videos, computer vision, powered by artificial intelligence, empowers these machines to recognise patterns, identify objects, and even comprehend activities. This mimics how the human brain processes visual stimuli. One particularly captivating avenue in computer vision is animal behaviour recognition.

Cattle Behaviour and Its Significance

The criticality of closely monitoring animals, especially high-value ones like cattle, is not lost on farmers. Behaviours offer insights into health, well-being, and productivity. Computer vision emerges as the solution, enabling monitoring of vital behaviours such as standing, lying, and eating without constant manual intervention. This not only saves time and labour but also pre-emptively identifies potential issues, thereby securing the health and happiness of our cherished livestock.

Hartpury University's Pioneering Work

At Hartpury University, we are pioneering the exploration of computer vision for cattle behaviour monitoring. Our research is laser-focused on crafting specialised algorithms primed for accurately recognising an array of behaviours displayed by cattle. From deciphering feeding patterns to pinpointing health indicators and breeding cues, our approach fine-tunes computer vision to cater to the specific demands of cattle management. Our mission? Revolutionising how farmers care for their livestock.

- **Technical Ingenuity: The Model Development**
  Delving deeper, our research project centres around developing a computer vision-based model that classifies cows' behaviour. At its core, we are engineering an algorithm grounded in computer vision principles. This algorithm leverages image features to categorise and detect behaviours exhibited by cows in images. We are effectively classifying behaviours by combining computer vision with a Convolutional Neural Network (CNN) model. Rigorous testing and comparison against leading methods will spotlight the proficiency of our approach.

- **Example: Feeding Behaviour Recognition**
  Consider this scenario: our algorithm meticulously examines images of cattle at their feeding stations. It deciphers how long each cow spends feeding, whether they exhibit healthy eating habits, and whether any unusual behaviours emerge. These insights are not just numbers on a screen; they inform decisions that impact cattle health and farm productivity. The amalgamation of computer vision and CNNs allows us to transform visual data into actionable intelligence.

Picture Courtesy: Hartpury University

- **Potential Impact and Future Applications**
  The ripples of our proposed method extend far and wide. Real-time cattle monitoring comes within grasp thanks to seamless integration with existing animal health surveillance systems. This amalgamation ushers in swift threat detection (encompass various issues such as diseases, injuries, or other factors that may pose a risk to the livestock), elevating animal welfare. But it does not end here. Our project lays the foundation for a plethora of future applications, including the widespread adoption of advanced livestock management technologies on industrial scales.

Looking Ahead: Expanding Horizons

While cattle behaviour recognition is our focal point, our gaze extends beyond. Pigs, sheep, and other farm animals beckon similar advancements. While these prospects extend beyond our present scope, they illustrate the transformative power of computer vision across the entire livestock management landscape.

With our foundational understanding in place, let us delve into the myriad benefits computer vision bestows upon livestock management:

- Advanced Support: Equipped with real-time data from computer vision, decision-makers are empowered to make informed choices, thus elevating cattle care, and management.
- Time and Labor Savings: The days of manual observation can fade into memory. Computer vision liberates time, enabling focus on other pivotal aspects of farm management.
- Enhanced Animal Welfare: Swift detection of health issues and proactive intervention translates to happier and healthier cattle.
- Sustainable Farming Practices: Through optimizing feeding and grazing practices, waste reduction and sustainable land use emerge, aligning with environmentally conscious practices.