Towards Designing an Explainable-AI based Solution for Livestock Mart Industry

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ABSTRACT

A model capable of explaining the different factors that impact the price point is essential for the needs of the market. It can also inspire confidence in buyers and sellers about the price point offered. To achieve these objectives, we have been working with the team at MartEye, a startup based in Portershed in Galway City, Ireland. Through this paper, we report our work-in-progress research towards building a smart video analytic platform, leveraging Explainable AI techniques.

KEYWORDS

Explainable AI, Video Analytics, Internet of Things, Cloud, AWS

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1 EXTENDED ABSTRACT

The objective of an online Mart[1] is to match buyers and sellers, to weigh animals and to oversee their sale. Valuation of animals lack standards and transparency in the Livestock Marts Industry. It is also a playground for agents who indulge in profiteering by selling or purchasing animals. The significant factors that should determine the price of the animals at the Mart are their lineage, physical attributes such as age, weight, and health. To ensure fair pricing of the animals, it is essential to understand data that determine their true value. Careful modelling and appropriate transparency consideration for valuation and pricing of animals should aid in stopping kickbacks, exorbitant commissions and price manipulations.

A reliable pricing method can be developed by ML models that can read through historical sales data. Moreover, it is possible for the visual recognition models of AI to recognize the features of animals and use that data for application of the pricing model. Collectively, it provides a valuable and unbiased tool for pricing of the animals at a Livestock Mart. *However, when AI models suggest or recommend a price, that in itself does not reveal too much (i.e., it acts like a black box) about the qualities and the abilities of an animal. An interested buyer would like to know more about the salient features of an animal before making the right choice based on his requirements.* Therefore, a model capable of explaining the different factors that impact the price point is essential for the needs of the market [1].

Our approach and early results. The proposed solution goes beyond prediction. It generates price recommendations with explanations, describing how the recommended price is derived at with explanations, instead of just predicting the price. We employ several existing model interpretation techniques to generate insights from the ML-based price prediction model. Figure 1 illustrates the explanations generated by the LIME (Local Interpretable Model-agnostic Explanations) technique, using the ML-based price prediction model.

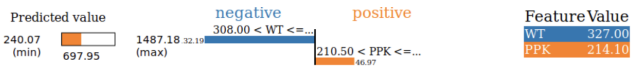

Figure 1: Model explanations generated by LIME.

The output of Figure 1 is a list of explanations, considering the contribution of each feature to a predicted price. The left part shows the range of a maximum (1487.18) and minimum (240.07) value, which is predicted by the ML-based price prediction module. The middle part shows the features (i.e., WT and PPK), which contribute the most in the predicted price of an animal. We can find that when the weight is in a range between $308.00 < WT <= 327.00$ it is contributing in a negative direction of the prediction. We can also clearly see that when PPK is in a range $210.50 < PPK <= 214.10$ it is contributing to the positive side of the total price. The right part shows the actual value of a particular feature (i.e., $Weight = 327.00, PPK = 214.10$).

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