**Case Study: Supervised Learning**

You are a manager at “Awesome Homes,” a real estate company specializing in vacation home rentals. Over the last five years, sales have decreased 10% annually, and customer feedback indicates that your company’s rental prices are seen as too low or too high relative to market value.

The rental prices of Awesome Homes are set through traditional means in which a team of real estate agents monitor various market metrics, and use their expertise to determine rental value. Your CEO has tasked you with managing a new team which will employ machine learning techniques in order to improve the rental price estimates.

1. Many of the real estate agents at Awesome Homes, close personal friends of yours, are worried about being replaced by computers. How can you gain their buy-in on this new initiative?

2. Is this initiative a supervised or unsupervised problem? Explain your reasoning.

3. What types of data do you need to gather in order to proceed?

Your new team presents several variations of machine learning models for estimating rental prices.

4. How do you train and test each model?

5. By what metrics will you determine the quality of the models’ performance?

6. How will you determine whether your models are coming up with better rental price estimates than were obtained from the traditional reliance on real estate agents’ expertise?

You applied one of your models to the training data, the model’s predictions of rental prices is sound and consistent. However, the model’s success is seriously compromised when new unseen data are entered.

7. What is going on with this model?

8. What steps can be taken to improve this model’s prediction capabilities?

Your team has assembled three models whose success rates are more or less identical. Here are some observations:

|  |  |  |  |
| --- | --- | --- | --- |
| Model | Time needed to train | Speed of prediction of a new home’s rental price | Average error on rental price predictions |
| A | 24 hours | One second or less | 5% |
| B | Six hours | Six hours | 1% |
| C | Five minutes | Two minutes | 10% |

9. Which model will you recommend to your CEO? Explain your decision.