Machine Learning Based Loan Approval System

(Interview Q/A)

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1. Explain the complete flow of the two-stage loan approval system in your own words.

The system works in two sequential steps. First, a classification model evaluates the applicant's financial and personal details to decide whether the loan should be approved or rejected. If the loan is approved, a second regression model is triggered to predict an appropriate loan amount. If the loan is rejected, the system stops and does not attempt amount prediction. This mirrors real-world banking workflows and prevents meaningless predictions.

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2. Why is approval prediction more critical than loan amount prediction?

Approval prediction determines whether a loan can exist at all. If the approval decision is wrong, any loan amount prediction becomes irrelevant. Banks prioritize minimizing risk, so deciding *who* gets a loan is more important than deciding *how much* to lend.

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3. How did preprocessing choices affect the model's behavior?

Preprocessing ensured that numerical and categorical features were treated correctly and consistently. Scaling prevented numeric features like income from dominating the model, while encoding allowed categorical variables to be learned properly. By using pipelines, preprocessing behaved identically during training and inference, which stabilized predictions.

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4. What challenges did you face when aligning training and inference pipelines?

The main challenge was ensuring that feature order, feature names, and preprocessing logic matched exactly during inference. Any mismatch caused incorrect predictions or runtime errors. Saving the full pipeline rather than only the model solved this problem.

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5. How would incorrect user input affect the prediction results?

Incorrect or unrealistic inputs can lead to unreliable predictions because the model has not seen such values during training. For example, extremely low or high credit scores may push the model into uncertain regions. Input validation is therefore essential in production systems.

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6. Why is modular project structure important for ML projects?

Modularity improves readability, maintainability, and scalability. It allows models, preprocessing, configuration, and prediction logic to evolve independently. This is especially important when transitioning from experimentation to deployment.

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7. How did feature importance help you understand model decisions?

Feature importance revealed which variables most influenced approval decisions, such as income or loan amount. This helped verify whether the model's behavior aligned with domain intuition. It also provided transparency for explaining predictions.

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8. What limitations does this loan approval system have?

The model depends heavily on the quality and representativeness of historical data. It cannot account for external economic factors or future financial changes. Additionally, it provides predictions, not guarantees, and should not replace human judgment.

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9. How would you improve this project if more data were available?

I would include more diverse applicant profiles, longer time spans, and additional financial features. I would also experiment with probability thresholds and model calibration. More data would help improve robustness and generalization.

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10. How would you explain this project to a non-technical stakeholder?

This system automatically helps decide whether a loan should be approved and estimates a reasonable loan amount for approved applicants. It uses past loan data to learn patterns and supports decision-making rather than replacing it. The goal is faster, more consistent loan evaluation.
