

Model Retraining and Feedback Loops

Automating and Improving Machine Learning
Models in Production.

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Agenda

- Setting up Automated Model Retraining Pipelines
- Handling Feedback and Human-in-the-Loop Systems
- A/B Testing and Canary Releases for Model Updates
- Best Practices Monitoring
- Conclusion
- Q&A

Setting Up Auto-Model Retraining Pipelines

Intuition:

Automated retraining pipelines allow ML models to be retrained regularly based on new data, ensuring that the model adapts to changes in the environment or user behaviour without manual intervention.

key components :

- data ingestion and preprocessing
- model retraining based on new data
- validation and testing
- deployment of the re-trained model

Why Auto-Model Retraining Pipelines Matter

- **adaptation to changing data** : regularly retraining the model ensures that it remains relevant in dynamic environments where data distribution may shift.
- **scalability** : automation allows the system to handle large volumes of data without manual effort, making it easier to scale ML operations.
- **efficiency** : automated retraining ensures faster response to performance issues and reduces model degradation over time.

Handling Feedback and Human-in-the-Loop Systems

Intuition:

Feedback loops allow for continuous improvement by incorporating user feedback or manual intervention when the model's predictions need refinement. Human-in-the-loop (HITL) systems ensure that human oversight can improve the model's learning process.

key components :

- collecting user or system feedback
- leveraging human expertise to correct model outputs
- retraining the model based on manual interventions

Why Feedback and HITL Systems Matter

- **improving model accuracy** : feedback allows models to learn from mistakes and improve their performance by incorporating corrections from experts.
- **handling edge cases** : HITL systems are particularly valuable in scenarios where the model encounters rare or ambiguous cases that it cannot handle on its own.
- **enhanced user trust** : feedback-driven improvements make models more aligned with user expectations, increasing trust in the system.

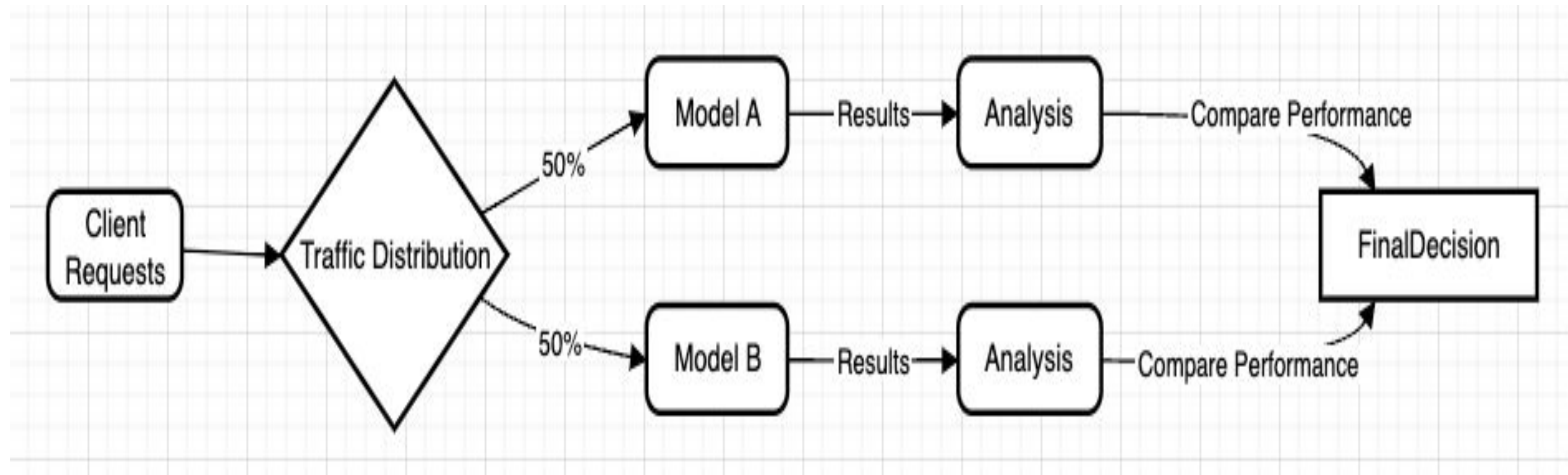
A/B Testing and Canary Releases for Model Updates

Intuition :

A/B testing and canary releases are techniques used to roll out model updates safely.

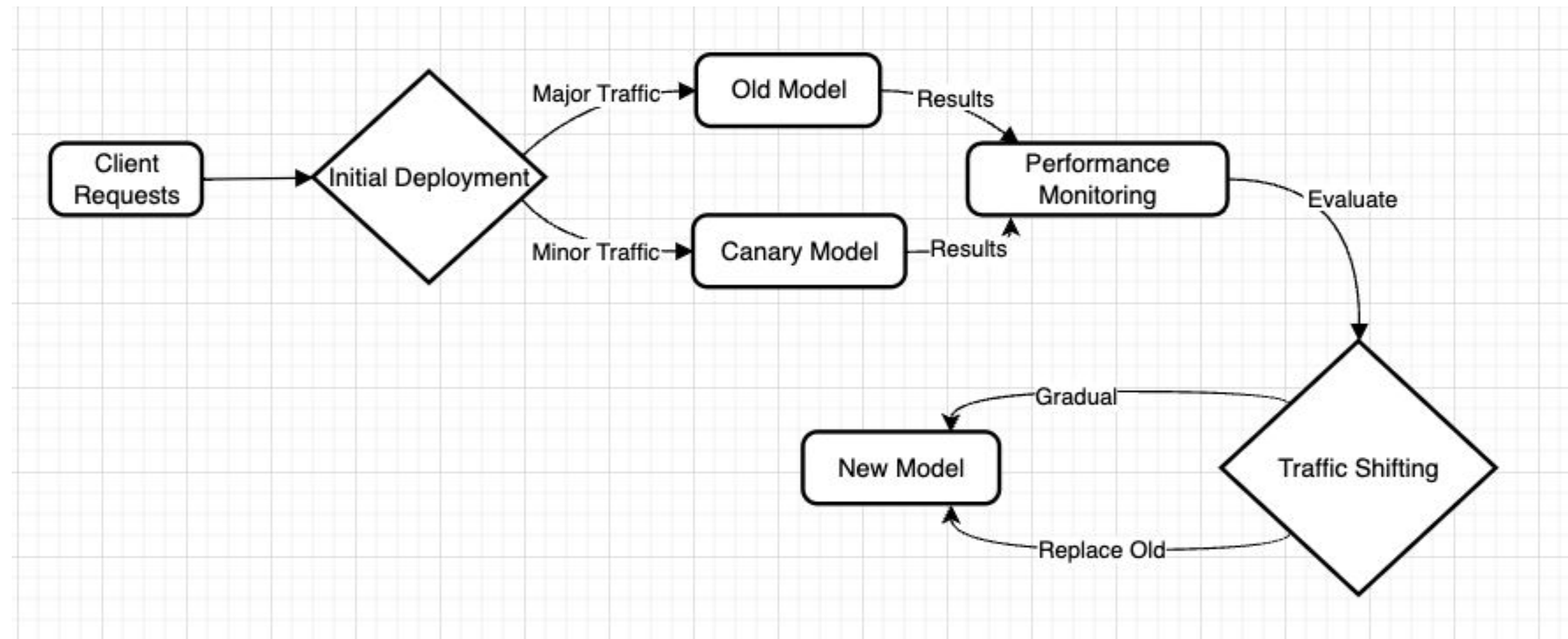
- A/B testing compares two models (new vs. existing) to measure their performance.
- canary releases deploy the updated model to a small subset of users to monitor its impact before full deployment.

A/B Testing and Canary Releases for Model Updates



A/B test release for model updates

A/B Testing and Canary Releases for Model Updates



Canary release for model updates

Why A/B Testing and Canary Releases Matter

- **risk management** : both techniques reduce the risk of deploying models that might negatively impact users or business metrics
- **data-driven validation** : A/B testing ensures that new models are objectively better based on performance metrics before full scale deployment.
- **safe model deployment** : canary releases allow teams to monitor real-world performance with minimal impact, ensuring that faulty updates can be reverted quickly.

Best Practices for Model Retraining and Feedback Loops

- **automate retraining pipelines** : ensure seamless model updates without manual intervention.
- **collect feedback continuously** : use feedback mechanisms to refine model predictions and improve user experience.
- **monitor model performance** : track key metrics regularly to detect drift or performance degradation.
- **test before deploying** : use A/B testing and canary releases to validate model performance before full rollout.
- **human oversight** : leverage HITL systems to handle ambiguous or edge cases where the model may struggle.

Conclusion

- Automated retraining and feedback loops are essential for maintaining high-performing models.
- Feedback and HITL systems play a critical role in improving models by incorporating human expertise.
- A/B testing and canary releases ensure safe and efficient model updates in production environments.

Q&A



Thank You!