**Case Study: Predicting Customer Churn at RetailGenius**

AI Project Methodology

*Report Submitted*

*by*

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**EPITA FALL 2023**

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**1.Introduction:**

RetailGenius is a rapidly growing e-commerce company with a diverse range of products, sellers, and customers. Recognizing the potential inherent in its vast trove of data, they launched a strategic program to derive value from its huge amount of Data. To achieve this goal, the company embarked on a strategic initiative aimed at harnessing its data-driven insights for enhanced operational efficiency and customer engagement. As part of this endeavour, RetailGenius initiated its inaugural AI project, with a primary focus on predicting customer churn.

This case study delves into the functional aspects of this project, exploring how RetailGenius can leverage data-driven insights to bolster its customer retention strategies and fortify its position in the competitive e-commerce arena.

**2.Project Strategy:**

**Strategic Objectives:**

* The primary objective of our AI project is to predict customer churn accurately. By identifying customers who are likely to churn, RetailGenius can proactively engage with them, personalize offers, and implement targeted retention strategies.
* optimize marketing spend by focusing efforts on retaining high-value customers rather than broadly targeting the entire customer base.

**key performance indicators (KPIs):**

* **Churn Rate**: Measuring the percentage of customers who leave RetailGenius over a specific period. A lower churn rate indicates successful retention efforts.
* **Precision and Recall**: Evaluating the model’s ability to correctly predict churn (precision) and identify all actual churn cases (recall).
* **Customer Engagement**: Monitoring the level of engagement and interaction with customers who have been identified as at-risk of churning can indicate the effectiveness of the retention strategies implemented based on the model's predictions.
* **Customer Satisfaction**: Gathering feedback from customers who were targeted with retention strategies based on the churn prediction model to assess their satisfaction and perception of the personalized offers and engagement efforts.
* **Customer Lifetime Value (CLV):** Tracking the value generated by retained customers over their lifetime. Higher CLV signifies effective retention strategies.
* **Reduction in Customer Complaints**: Monitoring the decline in complaints related to dissatisfaction or service issues.
* **Retention Cost**: Calculating the cost of retaining a customer compared to the cost of acquiring a new one.

**AI contribution to improve customer retention:**

* **Customized Recommendations**: AI algorithms are capable of producing customized product recommendations by examining the behaviour, preferences, and purchasing history of customers. RetailGenius can improve customer satisfaction, the shopping experience, and retention by providing personalized recommendations to each individual customer.
* **Predictive analytics**: RetailGenius can take action before customers depart thanks to churn prediction models. Targeted marketing, loyalty benefits, and customized communication are made possible by early identification.
* **Sentiment Analysis**: The use of AI can evaluate user input from a variety of sources, including surveys, social media, and reviews, to determine sentiment and pinpoint areas in need of development. RetailGenius may enhance retention by addressing issues, making required modifications, and fortifying consumer relationships by comprehending client emotion.
* **Feedback Analysis**: AI can analyse customer feedback, reviews, and social media sentiments. RetailGenius can address issues promptly and enhance customer satisfaction.
* **Segmentation**: AI-powered segmentation facilitates the identification of discrete customers. RetailGenius may customize retention tactics according to certain market categories, such as high-spending customers or regular buyers.

**3.Project Design:**

**Data:**

* Data Sources
  + Transaction data: Past records of consumer transactions, such as the frequency of purchases, the number of orders placed, and the types of products.
  + Data on Customer Interactions: Records of customer communications, including clicks, visits, and questions addressed to customer support.
  + Demographic Data: Details regarding the location, age, gender, and other pertinent demographics of the clients.
  + Behavioural Data: Metrics related to customer behaviour, such as session duration, cart abandonment rates, and product views.
  + Feedback and Reviews: Sentiments expressed in customer reviews, ratings, and feedback.
  + Churn Labels: A binary label indicating whether a customer churned (left) or remained active.
* Challenges In Using the Necessary Data
  + Data Quality and Consistency: Ensuring that data is accurate, complete, and consistent across different sources.
  + Imbalanced Data: Churn events are typically rare compared to active customers. Balancing the dataset is crucial.
  + Feature Engineering: Extracting relevant features from raw data and creating meaningful representations.
  + Privacy and Compliance: Handling sensitive customer information while adhering to privacy regulations.

**Model:**

* Suitable AI models for Churn Prediction
  + Logistic Regression
  + Random Forests
  + Neural Networks
* Model Training, Validation, And Testing
  + To guarantee the precision and dependability of the predictive model, careful handling of model training, validation, and testing is essential for RetailGenius' churn prediction project.
  + The initial step of the process involves gathering all pertinent information, including transaction histories, browsing habits, demographics, and engagement metrics, about the customers. Thorough data pretreatment methods are then used to remove noise from the data, deal with missing values, and harmonize formats.
  + Feature engineering is the next step, in which significant churn predictors are identified and extracted; new variables, such as customer lifetime value or frequency of purchases, may be included. The right machine learning techniques, like logistic regression or gradient boosting machines, are chosen for model training after the dataset is ready.
  + The dataset is split into training and validation sets during this stage in order to continuously assess model performance and avoid overfitting.
  + To optimize predictive accuracy, model parameters are fine-tuned using hyperparameter tuning in conjunction with cross-validation approaches such as k-fold cross-validation.
  + RetailGenius can safely deploy a powerful churn prediction model to improve customer retention strategies since validation metrics including accuracy, precision, recall, F1-score, and area under the ROC curve (AUC) serve as benchmarks to gauge model efficacy throughout this process.
* Model Versioning and Serving:
  + RetailGenius can adopt a systematic approach by utilizing a version control system like Git to track changes and tag each iteration with a unique version number
  + When deploying the model for serving, employing containerization technologies like Docker ensures consistency and scalability across different environments.

**Deployment:**

* Deployment Strategies:
  + Batch Processing: Periodically retrain the model and update predictions in bulk.
  + Real-time Scoring: Serve predictions in real-time as new data arrives.
  + Containerization: Package the churn prediction model and its dependencies into containers using Docker.
  + A/B Testing: Deploy multiple models simultaneously and compare their performance.
* Production Considerations
  + Scalability: Make sure the system can manage growing amounts of data and user demands.
  + Monitoring: Configure notifications for data drift, model failures, and declining performance.
  + Security: Guard data, model endpoints, and APIs.

**Monitoring:**

* Monitoring and Model Maintenance
  + Performance metrics: Track F1-score, recall, accuracy, and precision with time.
  + Compare the distributions of incoming and training data to detect data drift.
  + Retraining: Use new data to retrain the model on a regular basis.
  + Feedback Loop: To improve the model, get input from users and business stakeholders.

**4.Project Team:**

|  |  |  |
| --- | --- | --- |
| **Role** | **Responsibilities** | **Skills Needed** |
| Data Scientist | • Gathering, organizing, and preparing data. • Designing and training models for machine learning. • Evaluating the model's performance and making iterative improvements. • Collaborating with subject matter experts to improve AI solutions. | • Machine learning (ML) algorithms • Python/R programming • Feature engineering • Model evaluation and tuning |
| Data Engineer | • Managing and optimizing artificial intelligence data infrastructure. • Building robust data pipelines. • Ensuring data quality and consistency. | • ETL (Extract, Transform, Load) • SQL/NoSQL databases • Data pipeline development • Data quality checks |
| AI/ML Engineer | • Implementing AI models in production systems. • Moving ML solutions into production. • Optimizing the environment for performance and scalability. • Ensuring technical and business requirements are met. | • Machine learning research • Model deployment • Scalability and performance optimization • Software development • Cloud platforms (AWS, Azure, GCP) • Containerization (Docker, Kubernetes) |
| AI Architect | • Orchestrating deployment and management of models in production. • Providing inputs on model applicability within AI disciplines (e.g., natural language processing, image recognition). | • Model deployment architecture • AI domain expertise • Cloud services (e.g., AWS SageMaker, Azure ML) |
| Chief AI Officer | • Overseeing the overall AI strategy and alignment with business goals. • Ensuring cross-functional collaboration and successful AI initiatives. | • Strategic thinking • Leadership and communication • Business acumen and domain knowledge |

**Cross-functional collaboration and team alignment within project and team:**

* Clear Communication Channels
* Shared Goals and Objectives
* Interdisciplinary Workshops and Training
* Cross-Functional Projects
* Regular Updates and Progress Tracking

**Collaboration with other Departments:**

* Data Sharing and Insights Exchange
* Personalized Marketing Campaigns
* Proactive Customer Support
* Feedback Loop

**5.Project Governance & Communication:**

**Identifying Key Stakeholders and Communication Plan:**

**Stakeholders:**

1. **Executive Leadership**: CEO, CTO, CFO, etc., who provide overall strategic direction and support.
2. **IT Department**: Responsible for infrastructure, data management, and integration with AI systems.
3. **Data Science Team**: Those directly involved in developing and implementing AI models.
4. **Marketing Department**: Utilizes AI insights for customer segmentation, targeting, and engagement.
5. **Customer Service Team**: Utilizes AI insights for improving customer experience and retention.
6. **Legal and Compliance**: Ensures adherence to data privacy laws and ethical considerations.
7. **Finance Department**: Oversees budget allocation and financial reporting for the project.

The communication plan will involve,

1. **Regular Meetings**: Schedule regular meetings with stakeholders to provide updates on project progress.
2. **Reports**: Monthly or quarterly reports will be distributed to stakeholders. These reports will detail key milestones, challenges, and successes.
3. **Feedback Channels**: Dedicated channels will be established for feedback and questions. This ensures that concerns are addressed promptly.
4. **Transparency**: Maintain transparency in decision-making processes to foster stakeholder trust and buy-in.

**Governance Instances:**

1. **Steering Committee**: Comprising executives and department heads to provide strategic direction and resolve high-level issues.
2. **Project Review Boards**: Cross-functional teams responsible for evaluating technical aspects of the project, ensuring alignment with business goals.
3. **Change Control Board**: Manages changes to project scope, schedule, or resources to prevent scope creep and ensure project stays on track.

**Communicating Model Outputs and Predictions:**

1. **Technical Teams** :
   * Detailed Reports: Technical teams will receive comprehensive reports containing performance metrics, model architecture details, and specific recommendations for improvement.
2. **Non-Technical Teams** :
   * Simplified Summaries: Non-technical teams will receive concise summaries that highlight key insights and provide actionable recommendations. These summaries will be presented in a language they can easily understand.
3. **Alignment across teams** :
   * Regular Presentations and Workshops: To ensure understanding and alignment across all teams, we will conduct regular presentations and workshops.

**6.AI Project Management Methodology:**

**Agile Methodology:**

1. **Iterative Development:**
   1. Agile supports iterative development, allowing us to continuously improve the project based on feedback. This is especially crucial for AI projects with evolving requirements and changing data.
2. **Flexibility:**
   1. The Agile approach enables quick adaptation to changing market conditions, technological advancements, and stakeholder feedback. It ensures that we remain responsive and adaptable throughout the project’s lifecycle.
3. **Collaboration :**
   1. Agile promotes close collaboration between cross-functional teams. By fostering transparency and alignment with business objectives, we can achieve better outcomes and maintain stakeholder trust.

### **Potential Risks and Mitigation Strategies:**

1. **Data Privacy and Security** :
   * **Risk**: Data privacy and security breaches.
   * **Mitigation** : Implement robust data anonymization techniques and encryption protocols. Ensure compliance with relevant regulations (e.g., GDPR, CCPA).
2. **Model Bias and Fairness**:
   * **Risk**: Models exhibiting bias or unfair outcomes.
   * **Mitigation**: Regularly audit models for bias and fairness. Involve diverse teams in model development to mitigate biases.
3. **Technical Challenges** :
   * **Risk**: Technical hurdles during model development.
   * **Mitigation**: Conduct thorough testing and validation of models. Invest in continuous training and development for data science teams to stay updated with the latest advancements.
4. **Integration Issues** :
   * **Risk**: Challenges in integrating AI models into existing systems.
   * **Mitigation**: Ensure close collaboration between IT and data science teams. Streamline integration processes and address compatibility issues early on.

**Handling Costs and Planning Derivation:**

1. **Cost-Benefit Analyses** :
   * Conduct thorough cost-benefit analyses for each AI model iteration. Justify investments based on potential business impact.
2. **Project Tracking and Monitoring** :
   * Implement effective project tracking and monitoring systems. Identify deviations from the planned budget and schedule promptly.
3. **Prioritization**:
   * Prioritize iterations based on their potential impact on business outcomes. Focus resources on high-value initiatives while minimizing unnecessary expenditures.

**Conclusion:**

The Retail Genius AI initiative for predicting customer churn represents a pivotal step in leveraging technology to enhance customer engagement and retention. By integrating advanced AI models, this project not only aims to predict churn but also to personalize customer interactions, thereby solidifying Retail Genius’s position in the competitive e-commerce sector.

Our journey underscored the importance of quality data, effective model selection, and the agility to adapt through continuous learning. These elements are crucial for the project's success and for paving the way for future AI-driven strategies within the company.

As we conclude, it's clear that the project sets a foundation for a data-centric approach to business challenges. The insights gained and the methodologies developed will guide Retail Genius in its ongoing and future efforts to not just react to customer behaviour, but proactively enhance satisfaction and loyalty.

Looking ahead, Retail Genius is committed to refining its AI capabilities, with the churn prediction project serving as a benchmark for innovation, collaboration, and customer-centricity in our operations.

This succinct conclusion highlights the project's achievements and future implications, ensuring a comprehensive wrap-up of the AI initiative.