**AI ASSESSMENT AND CONSULTATION**

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| **Company Name:** | TechVantage Solutions |
| **Country:** | Sweden |
| **Consultation date:** | 12-07-2024 |
| **Expert(s):** | Dr. Erik Lindström, Dr. Lars Holm |
| **Consultation type: (Regular/Pop-up)** | Regular |

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| **AI maturity level:**  *(How mature and advanced the company’s AI technologies and capabilities are.)* | TechVantage Solutions, a Sweden-based company, specializes in developing advanced software solutions for the automotive industry. Despite their expertise in software engineering and data analytics, their AI capabilities are still in the early stages, and their current AI maturity is rated as moderate. |
| **Clear Definition of Goals:**  *(Whether the company’s aims and objectives are clearly articulated and achievable.)* | The company has a well-defined objective focused on enhancing the efficiency of predictive maintenance systems for electric vehicles (EVs) by integrating AI technologies. |
| **Current Solution Development Stage:**  *(Stage of development and readiness of the company’s AI solution)* | Currently, TechVantage Solutions utilizes a traditional rule-based system for predictive maintenance. This system relies heavily on pre-set thresholds and historical data analysis, which requires frequent manual updates and adjustments. The company is exploring the use of AI to automate the identification of potential failures in EV batteries and drivetrains by analyzing real-time sensor data. Initial experiments with simpler machine learning models, such as decision trees and random forests, have shown some promise, but the company is yet to implement more advanced AI solutions. |
| **Validity of Concept and Authenticity of Problem Addressed:**  *(Is the company’s idea practical, innovative, and addresses a genuine market need.)* | The concept of leveraging AI for predictive maintenance in electric vehicles is both valid and highly relevant to the current market. The integration of AI will not only enhance the efficiency of maintenance processes but also reduce operational costs and downtime, providing significant value to their clients. |
| **Integration and Importance of AI in the Idea:**  *(How central AI is to the company’s proposed solution and its significance in solving the problem.)* | AI is central to TechVantage’s vision of automating predictive maintenance. By deploying machine learning models capable of analyzing vast amounts of sensor data in real-time, the company aims to shift from a reactive to a proactive maintenance strategy. |
| **Long-Term Vision and Growth Plan:**  *(Company’s future aspirations and its roadmap to achieve them)* | TechVantage Solutions has a clear long-term vision, aiming to become a leader in AI-driven automotive solutions. Their growth plan includes expanding their AI capabilities to cover other aspects of vehicle performance optimization, such as energy efficiency and autonomous driving systems. |
| **Identified Target Market and Customer Segments:**  *(Clarity and appropriateness of the company’s target customers)* | Their target market includes automotive manufacturers and fleet operators, particularly those focusing on electric vehicles. |
| **Data Requirement Assessment:**  *(Clarity in what data is needed)* | The company requires extensive sensor data from EVs, including battery temperature, voltage, current, and drivetrain performance metrics. Additionally, they need historical maintenance records to train and validate their AI models. |
| **Data Collection Strategy:**  *(Company’s plan for gathering, storing, and utilizing data, ensuring it's both clear and feasible.)* | TechVantage Solutions has access to a growing dataset collected from their existing clients. This includes sensor data streamed in real-time from vehicles, as well as historical maintenance logs. The company plans to expand its data collection efforts by integrating with more vehicle models and manufacturers. |
| **Technical Expertise and Capability:**  *(Company’s technical skillset and its ability to execute the proposed idea)* | The team at TechVantage Solutions has strong technical expertise in software development and data analytics. However, their experience with implementing AI models in real-time systems is still developing, and they are seeking to build this capability with the help of external expertise. |
| **Expectations from FAIR Services:**  *(What services/recommendations does the Company require and what can be offered?)* | TechVantage Solutions seeks technical advice from FAIR Services on selecting the most suitable AI models for real-time data analysis, as well as guidance on integrating these models into their existing systems. |
| **Recommendations:**  *(Future steps, suggestions for improvement)* | |
| The initial experiments with basic machine learning models have provided a solid foundation, but more advanced AI techniques should be explored to achieve the desired predictive accuracy. Models such as LSTM (Long Short-Term Memory) networks and other time-series analysis methods are well-suited for processing the sequential data generated by EV sensors.  To improve the effectiveness of the predictive maintenance system, the following steps are recommended:   1. **Data Preprocessing:** Ensure that the sensor data is properly cleaned and preprocessed before feeding it into the AI models. This includes handling missing values, normalizing data, and ensuring consistency across different data sources. 2. **Model Selection:** Experiment with advanced models, including LSTM networks and convolutional neural networks (CNNs), to analyze time-series data. These models are capable of capturing complex patterns and can provide more accurate predictions of potential failures. 3. **Model Fine-Tuning:** Start with pre-trained models from well-established research, and fine-tune them using TechVantage’s proprietary dataset. This will help in achieving higher accuracy and better generalization to the specific conditions of EVs. 4. **System Integration:** Work on integrating the AI models with the existing maintenance system, ensuring that real-time data processing is seamless and that the system can handle large-scale data streams without latency. 5. **Validation and Testing:** Conduct extensive validation and testing using historical maintenance data to ensure that the AI models are reliable and accurate. This will involve comparing the AI predictions with actual maintenance records to assess performance. | |