Project Number: P4

Project Title: Developing a Dynamic Token Valuation Model for Carbon Credits

Project Clients: Dr Samuel Karumba, School of Computer Science and Engineering

Project Specializations: Software development, Computer Science and Algorithms, Blockchain Technology, Machine Learning, Deep Learning, Big data analytics, Visualization

Background:

The advent and rapid adoption of blockchain technology in recent years have paved the way for innovative solutions to address longstanding challenges across various sectors. One such sector, carbon trading, has witnessed the transformative potential of blockchain through the tokenization of carbon credits. By representing carbon credits as unique digital tokens on a blockchain, tokenization ensures traceability, transparency, and ease of trade. However, as tokenization becomes more widespread, it's becoming increasingly apparent that there are disparities in how these tokens are valued. Factors such as the origin of the carbon credit (geography), the methodology employed for carbon capture or reduction, and the specific project type all play a role in determining its value. However, the lack of a standardized valuation methodology across various decentralized blockchain-based carbon trading platforms has led to inconsistencies in how tokens are valued. These inconsistencies can result in market inefficiencies and undermine system trust. Therefore, addressing these valuation challenges is paramount, given the global urgency to address climate change and make carbon trading more effective and efficient.

This project focuses on the challenges surrounding tokenization and value assessment of carbon credits in blockchain. It offers timely and relevant subject matter that aligns well with the interdisciplinary nature of the capstone projects, encompassing aspects of computer science, economics, and environmental science. This project presents an excellent opportunity for students to gain hands-on experience with emerging technologies like blockchain while addressing real-world problems in the domain of carbon trading and climate action.

The main goals of this projects are:

1. Design a Unified Valuation Framework: Create a comprehensive framework considering the multifaceted variables influencing carbon credit values. This framework should be flexible enough to accommodate new factors as they emerge, ensuring its relevance and adaptability in the long run.

2. Develop a Dynamic Token Valuation Model: Using the above framework as a foundation, design and implement an algorithmic model capable of dynamically assessing the value of carbon credit tokens. This model should not just be a static rule-set but should leverage machine learning techniques to adapt and refine its valuation strategies based on real-world data (Optional).

3. Test and Validate the Model: Once developed, the model should undergo rigorous testing using real-world data sets to ensure accuracy, fairness, and robustness. Feedback loops should be incorporated to continually refine and optimize the model (Optional)." "Project

Requirements and Scope:

Research and Data Collection: The team should gather data on current carbon credit token valuations, factors affecting their price, and market dynamics.

Understanding Tokenization: The team needs a fundamental grasp of how tokenization works in the context of carbon credits. Basic blockchain knowledge would be helpful, though in-depth technical knowledge is not required.

Stakeholder Consultation: Engage with carbon trading platforms, environmentalists, and industry experts to understand the real-world challenges they face in token valuation.

Model Development: Using the insights gained, develop a simple algorithmic model that can factor in 2-3 key variables (like geography and carbon capture methodology) to arrive at a token value.

Prototyping and Testing: Implement a basic prototype of the valuation model and test it against sample data to ensure it's working as expected.

Documentation: All processes, findings, challenges, and steps taken should be well-documented, providing a roadmap for future teams or developers who might want to expand on this work.

Presentation: The team should be capable of showcasing their findings and prototype understandably to a non-technical audience.

Scope:

- Focus on Primary Variables: Given the time constraints and the complexity of the problem, the scope should be narrowed down to consider only 2-3 primary variables that influence token value. While many variables affect token valuation, prioritizing the most influential ones will make the project manageable.
- Limited Geographic Region: Instead of a global approach, the model could focus on carbon credit tokens originating from a specific region, e.g., Southeast Asia, to simplify the data collection and valuation processes.
- Prototype, Not Production: The goal is to develop a functional prototype that showcases the valuation model's potential. It doesn't need to be a fully-fledged, production-ready system.
- Use of Existing Tools: To simplify the project, students should leverage existing tools and platforms for model development and prototyping, rather than building everything from scratch.

- Iterative Feedback: The project should adopt an iterative approach instead of aiming for a perfect model in the first go. Initial findings and the prototype can be shared with the client for feedback, which can then be incorporated into refinements.
- Focus on Transparency: While advanced techniques can be employed in the model, the resulting valuation process must remain transparent and easily understandable. This ensures trust and clarity for all stakeholders."

Required Knowledge and skills:

- For the successful execution of this project, students should possess a foundational understanding of blockchain technology and tokenization concepts.
- Familiarity with basic data analysis and modeling techniques is essential, as the project involves deriving insights from data to develop a valuation model.
- Lastly, proficiency in a programming language for prototyping, and basic knowledge of economic principles underlying market valuation, would be advantageous.

Expected outcomes/deliverables:

- Source Code: A well-structured and commented source code for the prototype, inclusive of the valuation model and user interface.
- Documentation: Detailed documentation explaining the design, underlying algorithms, and logic of the valuation model. This should also include the methodology employed, data sources considered, and any assumptions made.
- User Guide: A step-by-step user guide to help stakeholders understand how to use the tool, input data, and interpret results. The guide should be designed with clarity and simplicity in mind, catering to users with varied technical backgrounds.
- Presentation Slides: A set of slides summarizing the project's objectives, processes, findings, and recommendations, suitable for presenting to stakeholders and other interested parties.