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Decentralized Finance: A Review of the Current Landscape and Future Opportunities

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Abstract: ***Decentralized finance (DeFi) is an ever-growing sector of the cryptocurrency and blockchain industry. Decentralized finance is aiming to transfigure the classical and traditional financial systems and modernize and innovate the old and rusty financial systems which regulate the centralized banks controlled by the governments of their respective countries. Decentralized finance provides a system that aims to penetrate all classes of society across the board to build an inclusive society regardless of background, race, or location.***

This research paper aims to provide a comprehensive outline of the present DeFi topography, including its history, major players, and significant applications. Additionally, the paper aims to explore the potential of DeFi and the challenges facing the DeFi industry to be brought into the mainstream of society averting the reluctance among a huge percentage of the skeptical population. This research paper also provides an overview of the problems associated with DeFi and their potential solutions.

Keywords: Decentralized Finance, Web 3.0, Web, Banking Technology, Financial Technology, Blockchain.

I. INTRODUCTION

Decentralized Finance, or DeFi, is an emerging sector of the cryptocurrency and blockchain industry that seeks to build a brand-new financial system that is open, inclusive, and decentralized. Unlike the orthodox financial systems, which is a sector dominated by big banks and such financial institutions, DeFi is based on blockchain technology, allowing anyone with an internet connection to access financial services without a middleman. DeFi aims to democratize finance and provide financial services to everyone, irrespective of background or nationality. This paper focuses on a detailed outline of the current DeFi landscape, including its history, major players, and key applications. It also focuses on opportunities and challenges faced by the industry as it continues to grow and bloom.

Decentralized banking, or DeFi banking, is an ever-growing sector of the decentralized finance industry that seeks to facilitate orthodox banking services such as lending, borrowing, and payment processing without the need for centralized mediators. Unlike orthodox banks that are governed by centralized governments, and operate on a permission system, DeFi utilizes blockchain technology to pivot itself towards decentralized, trustless, and permissionless financial transactions.

The DeFi financial ecosystem contains a variety of protocols, including decentralized lending platforms, decentralized exchange(DEXs), and stablecoins. These protocols allow users to make transactions like lending and borrowing funds from other users without the need for a bank or other financial mediators or any other go-betweens. Moreover, decentralized exchanges allow users to trade different cryptocurrencies dismissing the need for a centralized exchange, and providing greater authority over their own assets.

One of the most alluring advantages of decentralized banking is the prospect of reducing transactional costs by cutting out the middlemen and increasing financial inclusion. Removing go-betweens and instead depending on smart contracts to execute transactions, DeFi banking systems help us lower transaction fees while increasing the speed of the transactions. Moreover, DeFi systems may provide services to people who may not have access to orthodox banking systems due to their economic status or their location. Although academics in the fields of information systems and management acknowledge the novelty and potential influence of blockchain technologies, there is still a dearth of theoretical or empirical work on DeFi [1].

However, there are plenty of challenges we face along the way toward the implementation and adoption of decentralized banking systems into our mainstream society. Some of our main concerns are regulatory uncertainty, lack of user-friendly interfaces, and security concerns. Regulatory uncertainty makes it particularly difficult for the DeFi banking platforms to work under various jurisdictions, while the complexity of the decentralized protocols may make it a stumbling block for people who don't have the technical accolade making it hard for them to navigate through the proposed system or protocol. Moreover, DeFi banking platforms face the dangers of hacks and smart control exploits, which can lead to a loss of assets. A substantial corpus of literature in the information systems (IS) genre has been created as a result of the implications and design principles for blockchain and distributed ledger technology. [2]

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Overall, decentralized banking has a great prospect for reforming orthodox banking by facilitating financial services in a decentralized, trustless, and permissionless manner. As the DeFi industry grows it will be fascinating to observe the banking protocols evolve and the new wave of opportunities they create for the users of the DeFi services around the world.

II. LITERATURE REVIEW

In this section, we have discussed various related works on decentralized finance by many researchers. It discusses the approaches, and implementations that compare to our effort.

Dirk A Zetzsche, Douglas W Arner, and Ross P Buckley, 2020 [3] explained in their paper that DeFi (decentralized finance) is one of the most talked-about emergent technological developments in global finance, along with FinTech (financial technology), RegTech (regulatory technology), cryptocurrencies, and digital assets. Yet, its significance, legal ramifications, and policy ramifications are not well understood. They further added that DeFi, in essence, needs rigorous regulatory scrutiny. Regulation must concentrate on the reconcentrated portion of the value chain in situations where DeFi results in new forms of technological dependence in order to ensure effective oversight and risk management. In this framework, regulation is essential to support decentralization, much like regulation is essential to securities markets and other financial services. At times, regulation will be required to safeguard markets and players from being preyed upon by non-decentralized systems, such as when a market participant tries to utilize technology for regulatory arbitrage.

Johannes Rude Jensen, Victor von Wachter1, and Omri Ross, 2021 [4] explained that decentralized financial applications, or "DeFi," are a new class of open financial apps that are built on permissionless blockchains that are available to everyone. The total value of the assets locked in DeFi applications (TVL) increased from $675 million at the beginning of 2020 to more than $40 billion by the end of the first quarter of the following year due to a sharp rise in their popularity.

Patrick Schueffel, 2021 [5] explained that decentralized finance, or "DeFi," is completely dominating the Fintech industry. True open innovation encourages a dispersed innovation process that permits managed information transfer across organizational boundaries (Chesbrough, Vanhaverbeke, &West, 2014).

Kaihua Qin, Liyi Zhou, Yaroslav Afonin, Ludovico Lazzaretti, and Arthur Gervais, 2021 [6] compared centralized and decentralized finance and explained the major differences between the traditional and the new decentralized format of finance.

Fabian Schär, 2020 [7] explained that Decentralized Finance (DeFi), a recent blockchain sub-discipline, is focused on developing financial technology and services on top of ledgers that support smart contracts.

Yan Chen and Christiano Bellavitis, 2020 [8] noted that when it comes to lowering transaction costs and increasing available options, intermediaries frequently play crucial roles. Intermediaries are frequently used in commercial transactions to connect parties, build trust, and complete deals (Roth, 2015). Transacting parties might not be able to build relationships, conduct deals, or uphold commitments without intermediaries.

Eva Meyer, Prof. Dr. Isabell Welpe, and Prof. Dr. Philipp Sandner, 2022 **[9]** noted that Nakamoto (2008) developed the Bitcoin blockchain, the first consensus-governed, decentralized database of cryptographically linked blocks that stores and enables borderless, trustless, always-available, and digitally signed P2P-transactions, with the goal of doing away with the need for financial intermediaries by developing a solely code-based, openly accessible, and transparent financial system.

Iwa Salami, 2021 [10] noted that since users of DeFi protocols or decentralized apps are not required to comply with anti-money laundering (AML) and know-your-customer (KYC) standards, DeFi presents a dilemma in that it is linked to considerable sums of money laundering.

III. METHODOLOGY

Researching decentralized finance which utilizes blockchain technology needs a well-planned and thorough approach that considers and accounts for the unique traits of this rapidly evolving field. Following is the methodology being followed to research and find the solution to the question being raised in the field of DeFi:

1) The *research question* answered in this paper is as follows: “What are the technical solutions to solve the scaling problem of DeFi projects?”
2) An *extensive literature review* involving reviewing existing research and publications related to the research question is accomplished. This involved reading whitepapers, academic papers, and blog posts related to specific DeFi projects, as well as a wide variety of research on blockchain technology, economics, and finance.
3) *Data collection* involved accumulating relevant data related to the research question. This embroiled collecting data on DeFi projects, such as transaction volume, trading volume, liquidity, and token economics. Data can be collected from various sources, including blockchain explorers, DeFi analytics platforms, and social media.

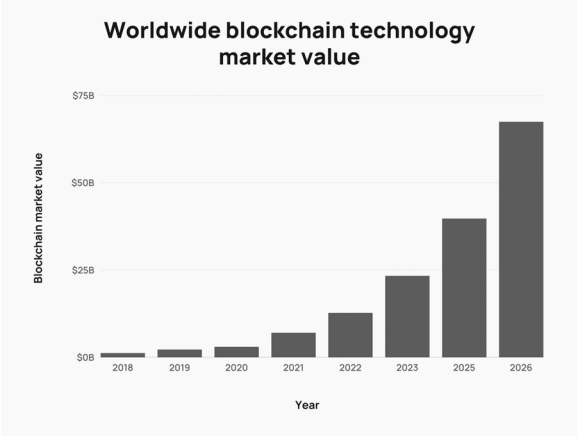


Fig1. Worldwide blockchain technology market value.

4) *Data analysis* embroiled analysis and interpretation of the data gathered in the last step. This involved utilizing statistical analysis to identify trends and patterns or performing a qualitative analysis to identify themes and insights.
5) *Case studies* embroiled analyzing specific DeFi projects in depth to gather insight into their governance, economics, and technology. Case studies provided valuable information into the strengths and weaknesses of specific DeFi projects, all the while pointing towards the broader trends in the DeFi ecosystem.
6) The final step of the research process embroiled *synthesizing* the findings of the previous steps and making recommendations based on the research. This involved identifying and gaining further insights into the areas for further research and then coming to the most probable conclusion or the answer to the research question based on the research conducted.

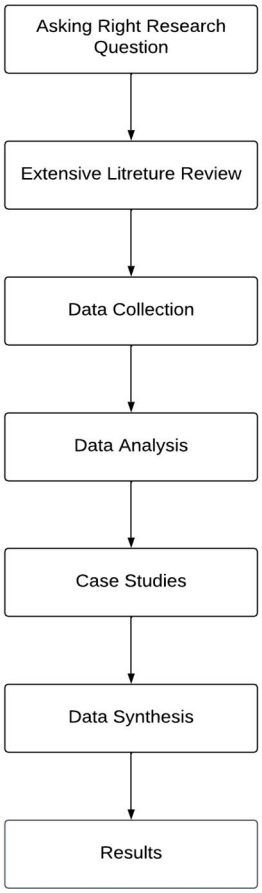


Fig2. Flow chart for methodology

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IV. RESULTS

There are various technical solutions that might be useful in order to address the scaling problem of DeFi projects:

Firstly, layer 2 solutions involve, state channels and sidechains that may offload transactions from the main blockchain, lower congestion, and increase transaction throughput. This works by allowing multiple transactions to be made that is, executed off-chain, and then settling them on the main blockchain at a later time.

Secondly, sharding refers to a technique where the blockchain is actually divided into smaller partitions or shards, and in turn, each shard can process transactions parallelly that is at the same time. This can boost the transaction processing capacity of the blockchain and reduce congestion.

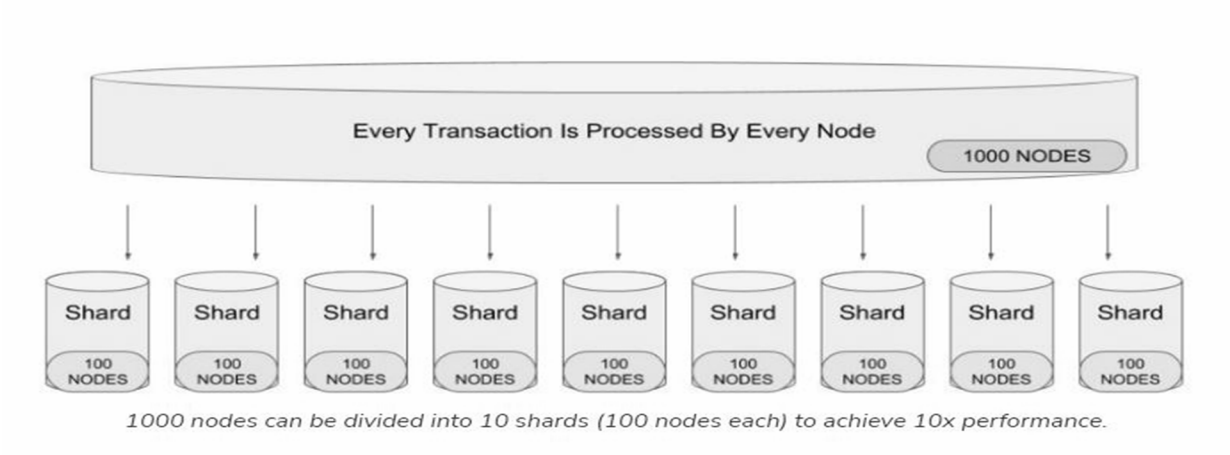


Fig3. Sharding in blockchain

Thirdly, proof-of-Stake (PoS) consensus algorithms happen to be far more energy-efficient than Proof-of-Work (PoW) algorithms and can boost the transaction processing speed of the blockchain. PoS blockchains also happen to be far more scalable as they permit more validators than PoW blockchains, which in turn have a limit set on the number of miners.

Fourthly, Optimistic rollups are a widely favored layer 2 scaling solution that enables off-chain transaction execution with an on-chain settlement. They work on the assumption that transactions are always valid unless they are proven otherwise, which lowers the amount of computation that is needed for the validation of the transaction and allows for far greater transaction throughput.

Fifthly, Sidechains refer to those independent blockchains that are attached to the main blockchain and can be used to execute transactions off-chain, which results in the lowering of the load on the main chain. These sidechains can be used to execute transactions that are not time-sensitive in nature or even require less security.

Sixthly, plasma is referred to as a scaling solution that allows for the creation of child chains that are connected to the main blockchain. The child chains can process transactions off-chain and they do periodically submit a summary of their state to the main chain, again lowering the amounts of computation which are needed for transaction validation.

V. DISCUSSIONS

Scaling a DeFi project means a lot to the growth of the industry, especially in terms of increasing its capacity to handle quite a larger volume of transactions, users, and liquidity which has always been a challenge for the people working in the industry. This can have quite significant implications for the DeFi industry as a whole, as mentioned below.

Firstly, scaling can help us enable DeFi projects to reach a wider audience by tapping into an untapped market and increasing adoption among the common people in their day-to-day lives. As DeFi projects become more and more scalable, they can handle a lot more users and also larger transaction volumes, which can help us make them far more attractive to a typical mainstream user who may have previously been deterred or hesitant because of high gas fees and slow transaction times. Users hold fungible units called governance tokens, which are used to distribute voting power in majority voting schemes.**[11]**

Secondly, scaling can also help us increase the liquidity of the DeFi ecosystem, which in turn can lead to far greater price stability and quite more efficient markets. As DeFi projects become more and more scalable, they can handle larger trading volumes, which in turn can then increase the liquidity of DeFi tokens and reduce price slippage.

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Thirdly, scaling can help us enable new use cases for DeFi projects which have never been thought of before, such as decentralized exchanges (DEXs) that can handle a high-frequency trading or lending platform that can support larger loan sizes. This can further help us expand the range of applications for DeFi projects and increase their utility for users.

Finally, scaling can help us drive innovation in the DeFi industry, as developers are able to experiment more and more with new protocols and feature more freely, that require greater transaction processing capacity.

This might eventually lead us to the development of various new DeFi products and services that can enhance the functionality and user experience of the ecosystem as a whole and drive the industry mainstream.

Overall, scaling a DeFi project can have significant positive implications for the industry, enabling it to reach new users, increase liquidity, expand the range of use cases, and drive innovation.

VI. CONCLUSION

Scaling up DeFi projects can help us have various possible implications for the DeFi industry. Scaling up DeFi projects will finally enable us to

1) *Increased Adoption:* By making DeFi projects more scalable, they can help us handle more and more users and larger and larger transaction volumes, which might eventually lead us to increased adoption and mainstream acceptance.
2) *Greater Liquidity*: Scaling up DeFi projects can help us increase the liquidity of the ecosystem, which might lead us to more efficient markets and reduce price slippage which is one of our major concerns as of now.
3) *Expanded use Cases*: Scaling up DeFi projects may enable us to build up new use cases and applications, like use cases involving high-frequency trading on DEXs or an even larger loan size on lending platforms.
4) *Improved user Experience*: By reducing gas fees and transaction times, scaling up DeFi projects might help us improve the user experience and help us be more inclusive of everyone irrespective of background of a person, making DeFi more accessible and user-friendly for all.
5) *Enhanced Innovation*: Scaling up DeFi projects might drive innovation in the industry to new heights, leading us to the development of many new protocols and features that might enhance the functionality and user experience of the ecosystem as a whole for all the users.

However, scaling up DeFi projects may also have potential challenges and risks, such as increased complexity, security vulnerabilities, and the need for ongoing research and development. Therefore, it is important to approach scaling with caution and to ensure that proper measures are in place to mitigate potential risks.

VII. FUTURE SCOPE

DeFi has the potential to transform the financial industry by increasing access, transparency, and efficiency to financial services. Here are some anticipated DeFi industry future developments:

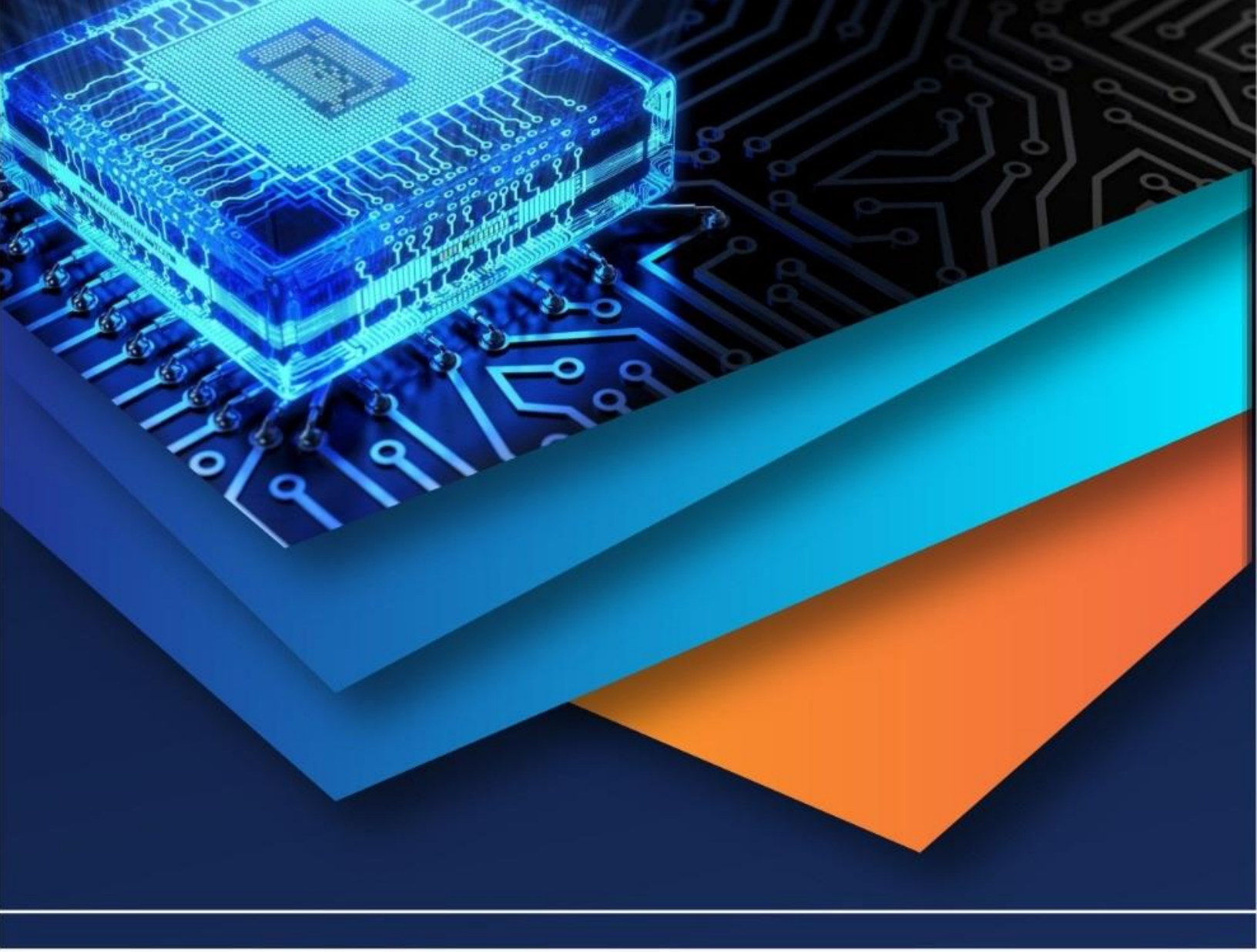
1) *Continued Growth*: The DeFi sector has grown rapidly in recent years, and this trend is expected to continue. The sector will continue to grow and adapt as more consumers and investors enter the market.
2) *Integration with Traditional Finance*: The DeFi business is anticipated to become more integrated with traditional finance as it matures. Partnerships between DeFi platforms and traditional financial institutions, as well as the development of hybrid DeFi/traditional finance products, could be examples of this.
3) *Improved user Experience*: Because the DeFi sector is still in its early stages, many systems are complex and difficult to browse. The user experience is anticipated to improve in the future as platforms become more user-friendly and accessible.
4) *Improved Security*: Security is a major concern in the DeFi market, and we should expect continuing efforts to strengthen security measures and lower the danger of hackers and assaults.
5) *Interoperability*: The DeFi business is made up of many distinct platforms and protocols, making it difficult for users to move assets across platforms. We should expect increasing compatibility across different DeFi platforms in the future, making it easier for consumers to move assets and access a broader range of services.
6) *Greater Regulatory Clarity*: As the DeFi market grows, we may expect increased regulatory scrutiny. However, this might lead to more clarity and uniformity in regulatory frameworks, which would boost investor confidence and encourage sector expansion.

Overall, the future of DeFi looks bright, with the potential to alter the financial system and increase access to and efficiency of financial services. While there are still obstacles to overcome, the DeFi industry's continuous expansion and evolution are anticipated to result in important advancements in the next years.

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