

Cognicraft: A Cognitive Computing Framework for Real-Time Craftsmanship

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Abstract: The abstract encapsulates the theoretical foundations, potential applications, and challenges of CogniCraft, a cognitive computing framework designed for advancing real-time craftsmanship. Grounded in insights from a comprehensive literature review, the theoretical architecture of CogniCraft integrates key cognitive computing elements, including real-time data processing, machine learning algorithms, a decision engine, and an adaptive interface. The framework holds theoretical significance across diverse domains, promising to enhance decision-making precision and craftsmanship improvement in healthcare, manufacturing, finance, emergency response, and customer service. Theoretical comparisons with existing frameworks underscore CogniCraft's potential advantages in agility, adaptability, and cognitive intelligence. However, theoretical challenges encompass interpretability, ethical considerations, scalability, and practical implementation complexities. Future research recommendations emphasize empirical validation, ethical refinement, user-centric design, and phased deployment strategies. As a theoretical exploration, CogniCraft emerges as a transformative force poised to shape the future of real-time craftsmanship through its cognitive capabilities, though practical validation and ongoing refinement are imperative for its successful integration into real-world applications.

Keywords: Cold supply chain, Food safety, Traceability of Food, Smart Technology, Blockchain-based Solution, Digital technologies;

1. Introduction

In the rapidly evolving landscape of technological advancements, cognitive computing has emerged as a transformative paradigm, harnessing the power of artificial intelligence to mimic human thought processes. This innovative approach extends beyond conventional computing, enabling machines to comprehend, learn, and adapt in complex, dynamic environments. The applications of cognitive computing are far-reaching, spanning diverse industries such as healthcare, finance, and manufacturing. By integrating machine learning, natural language processing, and advanced analytics, cognitive computing systems can process vast amounts of data to derive meaningful insights, thereby revolutionizing decision-making processes.

Amidst the multifaceted applications of cognitive computing, the significance of real-time craftsmanship stands out as a critical focal point. Craftsmanship, traditionally associated with the skilled and artistic execution of tasks, is now undergoing a profound transformation propelled by the demands of real-time operations. In domains such as manufacturing, healthcare, and logistics, the ability to execute tasks with precision and efficiency in real-time is paramount. The intricacies of real-time craftsmanship necessitate a paradigm shift in technological support, urging the exploration of cognitive computing frameworks that can augment human capabilities and enhance the quality of real-time decision-making.

The motivation for the development of the proposed cognitive computing framework, termed CogniCraft, stems from a comprehensive analysis of existing literature and secondary data. As technology continues to evolve, the synthesis of insights from a vast array of academic articles, books, reports, and case studies becomes imperative to inform the conceptualization of innovative solutions. The synthesis of this body of knowledge revealed a critical gap in the existing landscape – the need for a specialized cognitive computing framework tailored to address the challenges and opportunities presented by real-time craftsmanship across various domains. The deficiencies identified in current approaches, coupled with the potential for transformative advancements, provide a compelling rationale for the development of CogniCraft.

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By relying exclusively on secondary data, this research endeavour draws upon the collective wisdom of the academic and industry communities, distilling insights to construct a theoretical foundation for CogniCraft. This approach not only acknowledges the wealth of knowledge available but also aligns with the recognition that advancements in cognitive computing are often rooted in the synthesis and reinterpretation of existing ideas. Theoretical insights derived from the literature not only define the contours of the proposed framework but also underscore the potential of cognitive computing to enhance real-time craftsmanship.

As we delve into the intricate interplay between cognitive computing and real-time craftsmanship, it becomes evident that the fusion of these concepts holds the promise of reshaping how tasks are executed and decisions are made in real-time scenarios. The integration of cognitive computing principles within CogniCraft is poised to empower systems with the ability to analyze data dynamically, learn from experiences, and adapt to evolving circumstances, thus transcending the limitations of traditional computing paradigms. The theoretical underpinnings of CogniCraft, grounded in the insights gleaned from secondary data, pave the way for a nuanced exploration of its potential applications and impact on diverse domains.

The CogniCraft represents a significant stride towards addressing the burgeoning challenges associated with real-time craftsmanship. By synthesizing knowledge from existing literature and secondary data, this cognitive computing framework is conceived not in isolation but as a product of collective insights. The ensuing sections of this research paper will delve deeper into the theoretical framework, methodology, and practical implications of CogniCraft, providing a comprehensive understanding of how cognitive computing can be harnessed to elevate real-time craftsmanship across various domains.

1.1. The Concept of Cognitive Computing and Its Applications

Cognitive computing stands at the forefront of technological innovation, representing a paradigm shift in how machines process information and interact with their surroundings. Rooted in the principles of artificial intelligence (AI) and inspired by the human brain's cognitive abilities, cognitive computing systems possess the capacity to understand, reason, and learn from data in ways that transcend traditional computing approaches. At its core, cognitive computing aims to bridge the gap between human intelligence and machine capabilities, ushering in a new era where machines not only execute predefined tasks but also comprehend, adapt, and evolve in response to dynamic environments.

The applications of cognitive computing are vast and varied, permeating numerous industries and domains. In healthcare, for instance, cognitive computing plays a pivotal role in medical diagnosis, treatment planning, and drug discovery. By analyzing vast datasets of patient records, clinical research, and medical literature, cognitive systems can assist healthcare professionals in making informed decisions, offering personalized treatment plans, and identifying potential correlations that might elude human analysis. This capacity to process and interpret complex healthcare data not only enhances the accuracy of diagnoses but also contributes to the advancement of medical research.

In the financial sector, cognitive computing transforms the landscape of data analysis, risk management, and fraud detection. By sifting through immense volumes of financial data in real-time, cognitive systems can identify patterns, trends, and anomalies, providing financial institutions with valuable insights for decision-making. The ability to adapt to changing market conditions and anticipate potential risks positions cognitive computing as a strategic asset in the dynamic and fast-paced world of finance.

Manufacturing and supply chain management also benefit significantly from cognitive computing applications. Smart factories leverage cognitive systems to optimize production processes, predict equipment failures, and streamline supply chain logistics. This not only enhances operational efficiency but also contributes to cost savings and improved product quality. The integration of cognitive computing in manufacturing reflects a shift towards more adaptive and responsive production systems.

In customer service and interaction, cognitive computing manifests through virtual assistants, chatbots, and natural language processing applications. These systems can understand and respond to user queries in a contextually relevant manner, providing a more personalized and efficient customer experience. By continuously learning from interactions, cognitive systems improve their ability to understand user preferences and anticipate needs over time.

The education sector benefits from cognitive computing by offering personalized learning experiences. Adaptive learning platforms use cognitive technologies to analyze student performance, tailor educational content, and provide targeted feedback, thereby enhancing the effectiveness of teaching and learning processes.

The concept of cognitive computing has transcended theoretical frameworks to become a transformative force with tangible applications across diverse domains. Its ability to process vast datasets, learn from experiences, and adapt to changing circumstances positions cognitive computing as a catalyst for innovation in healthcare, finance, manufacturing, customer service, education, and beyond. As technology continues to advance, the impact of cognitive

computing is poised to deepen, reshaping how industries operate and unlocking new possibilities for solving complex challenges in an increasingly data-driven world.

1.2. The Importance of Real-Time Craftsmanship in Various Domains

The importance of real-time craftsmanship resonates across a multitude of domains, serving as a critical determinant of efficiency, precision, and success in various sectors. Craftsmanship, traditionally associated with the skilled execution of tasks, takes on heightened significance when performed in real-time, where the immediacy of action is paramount. From manufacturing to healthcare and beyond, the ability to execute tasks with precision and timeliness is not merely a desirable trait but a fundamental necessity that underpins operational excellence.

In the realm of manufacturing, real-time craftsmanship is synonymous with optimized production processes and superior product quality. As production lines become increasingly automated and interconnected, the timely execution of tasks becomes a linchpin for overall efficiency. Real-time craftsmanship ensures that each step in the manufacturing process is executed with precision, minimizing delays and bottlenecks. This not only accelerates the production cycle but also reduces the likelihood of errors, contributing to the delivery of high-quality products to market.

In healthcare, real-time craftsmanship holds the key to enhanced patient outcomes and streamlined medical procedures. From surgical interventions to diagnostic imaging, the ability to execute medical tasks in real-time is imperative. Surgeons rely on real-time craftsmanship to navigate complex procedures with precision, while diagnostic technologies demand swift and accurate interpretations of medical data. The timely execution of healthcare tasks directly correlates with improved patient care, faster recovery times, and, in some cases, can be a matter of life and death.

The logistics and transportation sector is another domain where the importance of real-time craftsmanship is unequivocal. From supply chain management to transportation scheduling, real-time decision-making and execution are critical for meeting delivery deadlines, optimizing routes, and minimizing operational costs. The intricacies of coordinating a network of suppliers, distributors, and transportation modes demand a level of craftsmanship that can adapt swiftly to unforeseen challenges and changes in real-time.

Emergency response and public safety also heavily rely on real-time craftsmanship. First responders, law enforcement, and disaster management teams depend on timely and precise execution of tasks to save lives and mitigate the impact of emergencies. From crisis communication to on-

the-ground interventions, the ability to craft responses in real-time is a cornerstone of effective emergency management.

Customer service, in the age of instant communication and digital interactions, underscores the importance of real-time craftsmanship. Whether through online support channels, chatbots, or virtual assistants, businesses need to respond to customer queries, concerns, and transactions in real-time to meet the expectations of a fast-paced and interconnected world. The crafting of real-time responses contributes not only to customer satisfaction but also to the overall reputation and success of a business.

The importance of real-time craftsmanship permeates virtually every facet of modern life and industry. Its significance lies not only in the execution of tasks with speed and precision but also in the adaptability to changing circumstances. As technology continues to advance, the ability to craft real-time solutions will remain a hallmark of efficiency, effectiveness, and excellence in diverse domains, shaping the trajectory of industries and the experiences of individuals worldwide.

2. Literature Review

2.1. Cognitive Computing and Its Evolution

Cognitive computing represents a transformative paradigm in artificial intelligence (AI) that strives to emulate human cognitive processes, revolutionizing how machine process information. Its evolution is marked by the integration of sophisticated technologies, including machine learning, natural language processing, and neural networks (LeCun et al., 2015). As we delve into the literature, the trajectory of cognitive computing's development becomes apparent.

The foundational components of cognitive computing, particularly machine learning, have seen notable progress. LeCun et al. (2015) emphasize the evolution of machine learning techniques, highlighting the shift from traditional rule-based programming to systems capable of learning patterns from data. This evolution is exemplified by the rise of deep learning algorithms, which excel at extracting intricate patterns and features from vast datasets, contributing to the robustness of cognitive computing systems.

Natural language processing (NLP), another key element, has undergone substantial refinement in the evolution of cognitive computing. NLP enables machines to understand and generate human language, facilitating more natural and intuitive interactions. The application of NLP in virtual assistants, chatbots, and language translation services reflects its evolution and increasing integration into everyday technologies (Jurafsky & Martin, 2020).

The inception of neural networks, inspired by the structure of the human brain, has been a pivotal development in

cognitive computing. These networks enable machines to simulate complex thought processes, allowing them to recognize patterns, make predictions, and adapt to changing circumstances. The evolution of neural networks has been instrumental in enhancing the cognitive capabilities of machines, enabling tasks that were once considered beyond the scope of computational systems (Bengio, 2009).

Furthermore, the evolution of cognitive computing extends beyond technological advancements to include a shift in conceptual frameworks. Early cognitive computing models focused on mimicking specific cognitive functions, while contemporary approaches emphasize holistic systems that integrate various cognitive abilities. This shift is exemplified by the transition from rule-based expert systems to more dynamic and adaptable cognitive computing architectures (Boden et al., 2016).

As cognitive computing continues to evolve, it confronts challenges related to interpretability, ethical considerations, and the need for seamless human-machine collaboration. Interpretability is

crucial for building trust in cognitive systems, especially in fields like healthcare and finance, where decisions have significant consequences (Carvalho et al., 2019). Ethical considerations, such as bias in algorithms, data privacy, and accountability, underscore the importance of responsible development and deployment of cognitive computing systems (Diakopoulos, 2016).

The evolution of cognitive computing is a dynamic journey marked by advancements in machine learning, natural language processing, and neural network architectures. From rule-based systems to sophisticated, learning-enabled frameworks, cognitive computing continues to redefine the boundaries of AI. However, as it progresses, addressing challenges related to interpretability and ethics becomes paramount to ensure responsible and beneficial integration into various aspects of our lives.

2.2. Real-Time Craftsmanship in Different Domains

Real-time craftsmanship serves as a linchpin in various domains, playing a pivotal role in ensuring precision, efficiency, and effectiveness across diverse sectors. The literature on real-time craftsmanship underscores its critical importance in sectors such as manufacturing, healthcare, logistics, and emergency response.

In manufacturing, real-time craftsmanship is synonymous with optimized production processes and superior product quality. Research by Smith and Johnson (2018) emphasizes the need for real-time precision in manufacturing, recognizing its direct impact on operational efficiency. The ability to execute tasks with precision in real-time not only accelerates the production cycle but also reduces the

likelihood of errors, contributing to the delivery of high-quality products to market.

Healthcare is another domain where real-time craftsmanship holds significant sway. Jones and Brown (2017) stress the critical role of real-time craftsmanship in medical procedures, highlighting its implications for patient outcomes. In surgeries, for instance, the ability to execute tasks with precision in real-time is imperative. The timely execution of healthcare tasks directly correlates with improved patient care, faster recovery times, and, in some cases, can be a matter of life and death.

The logistics and transportation sector relies heavily on real-time craftsmanship for efficient operations. From supply chain management transportation scheduling, real-time decision-making and execution are critical for meeting delivery deadlines, optimizing routes, and minimizing operational costs. The intricacies of coordinating a network of suppliers, distributors, and transportation modes demand a level of craftsmanship that can adapt swiftly to unforeseen challenges and changes in real-time (Gupta & Sharma, 2020).

Emergency response and public safety also depend on real-time craftsmanship. First responders, law enforcement, and disaster management teams rely on timely and precise execution of tasks to save lives and mitigate the impact of emergencies. The ability to craft responses in real-time is a cornerstone of effective emergency management, ensuring that resources are allocated efficiently and interventions are timely (Johnson et al., 2019).

Customer service, in the age of instant communication and digital interactions, underscores the importance of real-time craftsmanship. Whether through online support channels, chatbots, or virtual assistants, businesses need to respond to customer queries, concerns, and transactions in real-time to meet the expectations of a fast-paced and interconnected world. The crafting of real-time responses contributes not only to customer satisfaction but also to the overall reputation and success of a business (Smith & White, 2021).

The real-time craftsmanship is a universal requirement across diverse domains, ensuring optimal performance, decision-making, and adaptability. Its significance lies not only in the execution of tasks with speed and precision but also in the ability to adapt swiftly to changing circumstances, making it a critical factor in the success and efficiency of various industries.

2.3. Cognitive Computing Frameworks in Practice

The practical application of cognitive computing frameworks represents a significant stride in harnessing artificial intelligence capabilities to solve complex problems and enhance decision-making processes across various domains. This literature review delves into the

implementation and impact of cognitive computing frameworks in real-world scenarios.

One prominent example of a cognitive computing framework in practice is IBM's Watson. Watson has been extensively employed in the healthcare sector, demonstrating the feasibility of integrating cognitive computing in complex and dynamic environments (Ruttenberg et al., 2019). Watson's ability to analyze vast datasets, including medical literature, patient records, and clinical research, has empowered healthcare professionals with valuable insights for diagnostic support and treatment planning. Its practical applications showcase the potential of cognitive computing to augment human expertise and contribute to advancements in patient care.

In the financial sector, cognitive computing frameworks are making substantial contributions to data analysis, risk management, and fraud detection. Research by Smith and Brown (2018) emphasizes the significance of these frameworks in sifting through extensive financial data in real-time to identify patterns, trends, and anomalies. This real-time analysis enables financial institutions to make informed decisions, optimize risk mitigation strategies, and enhance overall operational efficiency.

Manufacturing industries have also embraced cognitive computing frameworks to optimize production processes and improve overall efficiency. By incorporating cognitive systems, such as predictive maintenance algorithms and adaptive quality control mechanisms, manufacturing plants can anticipate equipment failures and ensure that products meet stringent quality standards (Chen et al., 2019). The practical implementation of cognitive frameworks in manufacturing underscores their adaptability to dynamic and data-intensive environments.

The deployment of cognitive computing frameworks extends to customer service and interaction. Virtual assistants and chatbots, powered by cognitive technologies, have become integral components of customer service platforms. These systems can understand and respond to user queries in a contextually relevant manner, providing a more personalized and efficient customer experience (Jurafsky & Martin, 2020). The practical utilization of cognitive frameworks in customer service exemplifies their capacity to streamline interactions and improve user satisfaction.

Despite these notable successes, challenges persist in the practical implementation of cognitive computing frameworks. Ethical considerations, interpretability of results, and user acceptance are areas that require careful attention (Johnson & White, 2021). As cognitive systems become more prevalent in various domains, addressing these challenges is crucial to ensuring responsible and effective deployment.

The literature reviewed highlights the practical applications of cognitive computing frameworks across diverse domains, including healthcare, finance, manufacturing, and customer service. The successful implementation of these frameworks underscores their potential to revolutionize decision-making processes, optimize operations, and contribute to advancements in various industries. While challenges remain, ongoing research and advancements in the field continue to refine cognitive computing frameworks, opening new avenues for innovation and practical implementation.

2.4. Challenges and Opportunities in Real-Time Craftsmanship

Real-time craftsmanship, the ability to execute tasks with precision and efficiency in the immediacy of the moment, presents both challenges and opportunities across diverse domains. As we explore the literature, it becomes evident that the dynamic nature of real-time environments brings forth a set of intricate challenges while also paving the way for transformative opportunities.

One of the fundamental challenges in real-time craftsmanship, particularly in manufacturing, lies in the management of dynamic production processes. Gupta and Sharma (2020) emphasize the need for adaptive systems capable of responding swiftly to changing circumstances on the factory floor. The challenge here is not only to maintain precision but also to ensure that the craftsmanship aligns seamlessly with fluctuating demands, unforeseen disruptions, and evolving operational requirements.

In healthcare, real-time craftsmanship poses challenges in the context of medical procedures and diagnostics. Jones and Brown (2017) discuss the intricacies of executing tasks with precision in rapidly changing medical scenarios. The real-time nature of healthcare demands not only immediate decision-making but also the ability to adapt to unexpected developments during surgeries or emergency medical interventions. Maintaining craftsmanship under such time constraints is a persistent challenge.

The logistics and transportation sector faces challenges related to real-time decision-making in supply chain management and delivery processes. Gupta and Sharma (2020) note the complexities of coordinating a network of suppliers, distributors, and transportation modes. The challenge lies in ensuring that craftsmanship in logistics remains agile and responsive to real-time changes, optimizing routes and schedules dynamically.

Opportunities arise in addressing these challenges through advancements in technology. The advent of the Internet of Things (IoT) and real-time data analytics provides opportunities for enhancing craftsmanship in manufacturing and logistics. These technologies enable the continuous monitoring of equipment, products, and processes,

facilitating proactive decision-making and the maintenance of high precision (Gupta & Sharma, 2020).

In emergency response and public safety, the challenges of real-time craftsmanship are evident in the need for rapid, well-coordinated interventions. Johnson et al. (2019) discuss the difficulties faced by first responders in crafting real-time responses to emergencies. However, opportunities emerge through the integration of smart technologies, such as predictive analytics and real-time communication systems, enabling more effective and coordinated emergency responses.

Real-time craftsmanship also influences customer service in the digital age. Smith and White (2021) highlight the challenge of crafting real-time responses to customer queries, especially in the context of online interactions. The opportunity lies in leveraging cognitive computing and artificial intelligence to enhance real-time interactions, providing more personalized and efficient customer service experiences.

The challenges and opportunities in real-time craftsmanship underscore the dynamic nature of tasks executed in the immediacy of the moment. While challenges persist in maintaining precision amid rapid changes, advancements in technology present opportunities for innovation and improvement. The synthesis of real-time data, coupled with adaptive systems, provides a pathway for overcoming challenges and unlocking the full potential of real-time craftsmanship in various domains.

2.5. Integrating Cognitive Computing for Real-Time Decision-Making

The integration of cognitive computing into real-time decision-making processes represents a pivotal intersection of artificial intelligence and dynamic operational environments. The literature on this topic underscores the transformative potential of leveraging cognitive computing capabilities to enhance the speed, accuracy, and adaptability of decision-making across various domains.

In the realm of healthcare, the integration of cognitive computing for real-time decision-making has shown considerable promise. Ruttenberg et al. (2019) discuss applications of IBM Watson in healthcare, emphasizing its ability to analyze vast datasets, including patient records and clinical research, to provide diagnostic support and treatment recommendations. The real-time processing power of cognitive systems enables healthcare professionals to make more informed decisions, especially in situations where time is of the essence.

Similarly, in the financial sector, cognitive computing frameworks are increasingly utilized to optimize real-time decision-making processes. Smith and Brown (2018) highlight the significance of these frameworks in sifting

through extensive financial data in real-time, identifying patterns, trends, and potential risks. The ability to process and analyze large datasets swiftly empowers financial institutions to make informed decisions, adapt to market changes, and manage risks proactively.

Manufacturing industries are also benefiting from the integration of cognitive computing into real-time decision-making. Chen et al. (2019) discuss the transformative potential of cognitive computing in manufacturing, particularly in the areas of predictive maintenance and quality control. Cognitive systems can analyze real-time data from sensors and machinery, predicting equipment failures and ensuring product quality by making adjustments dynamically during the production process.

The practical implementation of cognitive computing for real-time decision-making is not without challenges. Interpretability of results, ethical considerations, and the need for transparent decision-making processes are among the challenges highlighted by Johnson and White (2021). As cognitive systems become more prevalent, addressing these challenges is crucial to ensure responsible and effective deployment.

Opportunities arising from the integration of cognitive computing into real-time decision-making lie in its ability to learn and adapt. Cognitive systems continuously learn from experiences, improving their decision-making capabilities over time. The adaptability of these systems is particularly beneficial in dynamic environments where conditions change rapidly.

The literature on integrating cognitive computing for real-time decision-making highlights its transformative impact across various sectors. From healthcare to finance and manufacturing, the ability of cognitive systems to process vast amounts of data in real-time, make informed decisions, and adapt to changing circumstances positions them as powerful tools for enhancing decision-making processes. As technology continues to advance, the integration of cognitive computing is poised to become increasingly sophisticated, unlocking new possibilities for precision and efficiency in real-time decision-making.

2.6. Enhancing Craftsmanship through Cognitive Computing

The integration of cognitive computing has emerged as a transformative force in enhancing craftsmanship across various domains. This literature review explores how cognitive computing contributes to the improvement of craftsmanship, emphasizing its ability to analyze complex data, facilitate decision-making, and augment human expertise.

In the healthcare sector, cognitive computing plays a crucial role in enhancing diagnostic precision and treatment

planning. Ruttenberg et al. (2019) discuss applications of IBM Watson in healthcare, illustrating how cognitive systems can analyze vast datasets of medical literature, patient records, and clinical research. By processing and interpreting this information, cognitive systems assist healthcare professionals in making informed decisions, offering personalized treatment plans, and identifying patterns that may elude traditional analysis. This application of cognitive computing not only enhances the accuracy of diagnoses but also contributes to the advancement of medical research.

Manufacturing and production processes are also experiencing significant improvements through the integration of cognitive computing. Chen et al. (2019) highlight how cognitive technologies are employed in smart factories to optimize production processes, predict equipment failures, and streamline supply chain logistics. The real-time analysis of data allows cognitive systems to identify inefficiencies, adapt manufacturing processes, and enhance overall operational efficiency. By leveraging cognitive computing, manufacturing industries are achieving a level of craftsmanship that is both adaptive and responsive to dynamic production environments.

Customer service and interaction are domains where cognitive computing enhances craftsmanship through natural language processing and machine learning. Virtual assistants, chatbots, and automated response systems leverage cognitive technologies to understand and respond to user queries in a contextually relevant manner (Jurafsky & Martin, 2020). This not only streamlines customer interactions but also improves the quality of service by providing timely and accurate information. Over time, cognitive systems improve their ability to understand user preferences, enabling a more personalized and efficient customer experience.

The education sector is also witnessing advancements in craftsmanship through the integration of cognitive computing. Adaptive learning platforms use cognitive technologies to analyze student performance, tailor educational content, and provide targeted feedback. By adapting to individual learning styles and needs, cognitive systems enhance the effectiveness of teaching and learning processes (Holmes & Bialik, 2016). This personalized approach contributes to improved student outcomes and the overall quality of education.

While cognitive computing holds immense potential for enhancing craftsmanship, challenges persist. Interpretability of results, ethical considerations, and the need for transparent decision-making processes are areas that require careful attention (Johnson & White, 2021). Despite these challenges, the literature suggests that the ongoing integration of cognitive computing will continue to redefine craftsmanship across various domains, contributing to more

informed decision-making and improved outcomes.

2.7. Ethical Considerations and User Acceptance

Ethical considerations and user acceptance are pivotal aspects in the integration of cognitive computing technologies. Johnson and White (2021) underscore the critical importance of addressing ethical concerns surrounding the use of cognitive systems in decision-making processes. This includes transparency in algorithmic decision-making, prevention of biases in data-driven insights, and ensuring user privacy.

User acceptance is intricately linked to the success of cognitive computing applications. Research by Smith and Brown (2018) highlights that users need to trust and understand the outputs of cognitive systems for widespread acceptance. A lack of transparency or perceived biases can erode trust. Thus, a delicate balance between transparency and the complexity of algorithms is crucial for fostering user confidence and facilitating the seamless adoption of cognitive technologies.

As cognitive computing becomes more prevalent in diverse domains, a proactive approach to ethical considerations and a user-centered design philosophy are imperative. By addressing ethical concerns and ensuring user acceptance through transparent and trustworthy implementations, cognitive computing applications can realize their full potential while maintaining ethical standards and user trust.

2.8. Future Directions and Research Gaps

As we contemplate the future directions and potential research gaps in the realm of cognitive computing for real-time craftsmanship, several critical areas emerge that warrant exploration. One key avenue for future research involves advancing the interpretability and transparency of cognitive systems. As these systems become integral to decision-making processes, developing models that not only yield accurate outcomes but also offer clear insights into their decision logic is essential. Improving interpretability is particularly crucial in sectors where ethical considerations and accountability are paramount.

Scalability and robustness pose ongoing challenges that demand attention in future research endeavors. As data volumes continue to escalate, there is a pressing need for cognitive frameworks that can seamlessly scale to handle vast datasets in real-time scenarios. Additionally, ensuring the resilience of cognitive systems in dynamic and unpredictable environments remains a critical research gap. Future studies should focus on developing systems capable of adapting to unforeseen circumstances, ensuring reliability in dynamic real-world applications.

Another unexplored dimension in the trajectory of research involves the integration of human-centric design principles.

Understanding user experiences, expectations, and concerns related to real-time craftsmanship supported by cognitive technologies is paramount. Future research efforts should prioritize user-centered approaches to enhance the acceptance and successful integration of cognitive computing frameworks across diverse domains.

Ethical considerations continue to be a focal point for future exploration. Establishing guidelines and frameworks that govern the ethical use of cognitive technologies is imperative. Researchers should delve into strategies for mitigating biases, ensuring fairness, and defining ethical standards to guide the responsible deployment of cognitive systems in real-time decision-making.

In conclusion, future research in cognitive computing for real-time craftsmanship should navigate toward advancing interpretability, scalability, user-centric design, and ethical considerations. By addressing these potential research gaps, the field can evolve toward more responsible, transparent, and effective applications of cognitive computing in real-time decision-making processes.

3. Method

The research methodology incorporates the different strategies and procedures for directing an examination. Research is a specialty of logical examination. In other word research is a logical and orderly look for relevant data on a particular point. The rationale behind mulling over research system is that one can know about the technique and method received for accomplishment of the goal of the project.

The objective is to study the impact of cognitive computing on real-time craftsmanship. Therefore, Author can choose a qualitative research study to investigate the various challenges in the deployment of cognitive systems for real-time craftsmanship also enhance user acceptance through human-centric design. Author can follows a systematic literature review method, which adheres closely to a set of scientific methods that aims to limit systematic error (bias), mainly by attempting to identify, appraise and synthesize all relevant studies. Undertaking a survey gives the best proof to illuminating academics and practitioners by adopting a “replicable, scientific and transparent process”. To reduce potential bias, we adopted two different approaches: a qualitative approach based on a bibliometric analysis and a qualitative approach centered on a content analysis of the literature.

Author uses the qualitative research methodology to examine the impact of cognitive computing on real-time craftsmanship.

4. Guidelines for Graphics Preparation and Submission

The architecture of CogniCraft is conceived based on a theoretical design that amalgamates insights gleaned from a comprehensive literature review on cognitive computing

frameworks and real-time craftsmanship. This innovative framework is conceptualized to synergize cognitive computing elements, offering a holistic approach to enhance real-time decision-making across diverse domains.

The theoretical architectural design of CogniCraft envisions a modular structure comprising key components that collectively contribute to the framework's efficacy. Drawing from insights derived from the literature, these components include a data processing module, machine learning algorithms, a decision engine, and an adaptive interface. The data processing module is designed to ingest and preprocess vast datasets in real-time, facilitating the seamless integration of cognitive computing technologies.

The roles of different components within CogniCraft are elucidated based on the synthesis of secondary data. The machine learning algorithms, embedded within the framework, play a pivotal role in pattern recognition and data analysis, allowing CogniCraft to distill meaningful insights from complex datasets. The decision engine, another critical component, processes these insights, leveraging cognitive computing capabilities to generate informed and contextually relevant decisions in real-time. The adaptive interface serves as the user interaction layer, facilitating intuitive and dynamic engagement with the cognitive system.

The identified cognitive computing elements, as discerned from the literature review, theoretically contribute to the improvement of real-time decision-making and craftsmanship within the CogniCraft framework. The machine learning algorithms, driven by insights from diverse datasets, enable the framework to discern patterns, trends, and anomalies, enhancing the precision and adaptability of decision-making processes. The decision engine, empowered by cognitive capabilities, ensures that decisions are not only rapid but also imbued with a nuanced understanding of the contextual intricacies at play.

Furthermore, the adaptive interface is designed to foster a symbiotic relationship between the cognitive system and the end user, ensuring that the craftsmanship improvements driven by CogniCraft are not only effective but also user-friendly. The cognitive computing elements collectively contribute to an ecosystem where real-time decision-making is not just a mechanized process but an intelligent and context-aware orchestration.

In essence, the theoretical architecture of CogniCraft represents a sophisticated integration of cognitive computing elements, derived from a robust literature review, to theoretically enhance real-time decision-making and craftsmanship. While this conceptualization lays the groundwork, empirical validation and iterative refinement based on practical implementations will be crucial for translating these theoretical constructs into a functional and

impactful cognitive computing framework.

4.1. Implementation:

The theoretical aspects of implementing CogniCraft draw upon insights derived from an extensive literature review on cognitive computing frameworks, real-time decision-making, and craftsmanship improvement. The envisioned implementation revolves around the seamless integration of cognitive computing elements to create a dynamic framework capable of orchestrating real-time decisions across diverse domains.

The theoretical implementation of CogniCraft is rooted in the understanding that the data processing module serves as the backbone, necessitating real-time ingestion and preprocessing of diverse datasets. The machine learning algorithms, guided by insights from the literature, are poised to harness the power of advanced pattern recognition and data analysis. These algorithms, embedded within the framework, form the cognitive core, allowing CogniCraft to distill intricate patterns, derive meaningful insights, and adapt to evolving datasets in real-time.

The decision engine, another critical component, theoretically encapsulates the cognitive capabilities required for rapid and informed decision-making. Drawing from literature insights, this module is designed to incorporate context-awareness, ensuring that decisions generated by CogniCraft are not only swift but also cognizant of the nuanced complexities within the operational environment. The adaptive interface, grounded in user-centric design principles, aims to provide an intuitive interaction layer, facilitating seamless communication between users and the cognitive system. However, the theoretical implementation of CogniCraft is not without its challenges and limitations, as discerned through the analysis of secondary data. One identified challenge lies in ensuring the interpretability and transparency of the cognitive decision-making processes. As cognitive systems inherently involve complex algorithms and models, making the decision-making process understandable to end-users and stakeholders becomes a crucial concern. This aligns with broader ethical considerations and the need for accountability in deploying cognitive systems, emphasizing the importance of addressing these challenges in the implementation phase. Additionally, scalability and adaptability are theoretical challenges that must be carefully considered during implementation. While the theoretical design envisions a framework capable of real-time adaptability, the practical implications of scaling the system to handle large datasets and dynamic operational environments need to be rigorously explored. These challenges underscore the necessity for a robust empirical validation phase, allowing for iterative refinement and optimization based on real-world implementations.

The theoretical aspects of CogniCraft's implementation reflect a sophisticated integration of cognitive computing elements to enhance real-time decision-making and craftsmanship. However, the identified challenges and limitations highlight the need for careful consideration and empirical validation to bridge the gap between theoretical constructs and practical implementation successfully.

4.2. Evaluation:

The theoretical evaluation of CogniCraft entails a comprehensive exploration of its potential effectiveness, drawing upon insights derived from the existing literature on cognitive computing frameworks, real-time decision-making, and craftsmanship improvement. The synthesis of these insights provides a theoretical foundation to assess the implications of CogniCraft in enhancing decision-making processes across diverse domains.

The potential effectiveness of CogniCraft lies in its incorporation of cognitive computing elements, guided by theoretical insights from the literature. The data processing module, theoretically designed for real-time ingestion and preprocessing, positions CogniCraft as a dynamic system capable of handling the velocity and variety of contemporary datasets. The machine learning algorithms, rooted in advanced pattern recognition, theoretically empower the framework to distill meaningful insights from complex and evolving data, enhancing the precision and adaptability of decision-making.

The decision engine, theoretically imbued with cognitive capabilities, stands as a crucial component for ensuring effective real-time decision-making within CogniCraft. The contextual awareness embedded in this module theoretically enables the framework to navigate the intricacies of dynamic operational environments. The adaptive interface, inspired by user-centric design principles, holds the potential to enhance user interactions, ensuring a seamless and intuitive engagement with the cognitive system.

The theoretical implications of CogniCraft can be further contextualized through theoretical comparisons with existing frameworks or traditional methods. In contrast to traditional decision-making approaches, CogniCraft offers a paradigm shift by leveraging cognitive computing for real-time adaptability and intelligence. The theoretical comparisons suggest that CogniCraft has the potential to outperform traditional methods in scenarios where rapid decision-making, adaptability, and nuanced understanding of contextual factors are critical.

Furthermore, theoretical evaluations highlight CogniCraft's potential in surpassing existing frameworks by virtue of its holistic integration of cognitive computing elements. Traditional frameworks may lack the agility and intelligence required for real-time decision-making in dynamic environments, whereas CogniCraft, in theory, addresses

these limitations by leveraging advanced algorithms and dynamic adaptability.

However, it is essential to acknowledge that the theoretical evaluation of CogniCraft is based on conceptual insights from the literature, and its practical effectiveness would be subject to empirical validation. The dynamic nature of real-world scenarios, user interactions, and the nuances of specific domains would contribute to shaping the actual impact of CogniCraft in practice.

The theoretical evaluation of CogniCraft underscores its potential effectiveness in enhancing real-time decision-making and craftsmanship improvement. The comparisons with existing frameworks or traditional methods provide theoretical insights into the unique advantages CogniCraft may offer in terms of agility, adaptability, and cognitive intelligence. The empirical validation and iterative refinement of these theoretical constructs are crucial steps towards realizing the full potential of CogniCraft in practical implementations.

4.3. Applications and Case Studies:

The theoretical exploration of potential applications for CogniCraft in real-world scenarios is grounded in insights derived from a thorough examination of secondary data encompassing cognitive computing frameworks, real-time decision-making, and craftsmanship improvement. The versatility of CogniCraft positions it as a theoretical powerhouse with applications spanning diverse domains, showcasing its potential to revolutionize decision-making processes and elevate craftsmanship in various contexts.

In healthcare, CogniCraft holds theoretical promise as an invaluable tool for diagnostic support and treatment planning. The framework, theoretically equipped with advanced machine learning algorithms, could analyze extensive datasets of medical literature, patient records, and clinical research in real-time. This capability theoretically enhances the precision of diagnoses, assists healthcare professionals in formulating tailored treatment plans, and contributes to medical research by identifying patterns and trends that may elude traditional analysis.

In manufacturing, the theoretical application of CogniCraft extends to optimizing production processes. The framework, driven by theoretical insights from machine learning algorithms, could predict equipment failures and adapt production parameters dynamically. Theoretically, this proactive approach ensures optimal operational efficiency, reduces downtime through predictive maintenance, and enhances overall product quality by adjusting parameters in real-time based on continuous analysis of production data.

The financial sector could benefit theoretically from CogniCraft's real-time decision-making capabilities. By

processing vast amounts of financial data in real-time, the framework could theoretically identify patterns indicative of market trends, potential risks, and investment opportunities. The cognitive computing elements within CogniCraft could contribute to more informed decision-making, allowing financial institutions to adapt swiftly to market changes and optimize risk management strategies.

In emergency response and public safety, the theoretical application of CogniCraft lies in enhancing real-time decision-making during crises. By theoretically leveraging its cognitive capabilities, the framework could process and analyze data from various sources, providing emergency responders with timely and contextually relevant information. This theoretical application could contribute to more effective and coordinated responses to emergencies, ensuring the allocation of resources based on dynamic situational assessments.

Customer service experiences could be theoretically transformed through the integration of CogniCraft. The framework, theoretically guided by adaptive interfaces and natural language processing, could facilitate personalized and efficient interactions with users. Virtual assistants powered by cognitive computing could theoretically understand user queries contextually, providing more accurate and relevant responses, thereby improving overall customer satisfaction.

The potential effectiveness of CogniCraft is theoretically supported by examples and case studies from the literature. In healthcare, studies have demonstrated the efficacy of cognitive computing frameworks in supporting clinical decision-making and improving patient outcomes (Ruttenberg et al., 2019). The implementation of similar cognitive capabilities within CogniCraft could theoretically yield comparable benefits in real-time healthcare decision support.

In manufacturing, case studies have highlighted the successful deployment of cognitive systems for predictive maintenance and quality control (Chen et al., 2019). Theoretical integration of these capabilities within CogniCraft could enhance real-time decision-making in production processes, optimizing equipment performance and ensuring adherence to quality standards.

Financial institutions have shown theoretical interest in cognitive computing for data analysis and risk management (Smith & Brown, 2018). CogniCraft, theoretically equipped with similar capabilities, could contribute to more informed and agile decision-making in the financial sector, potentially improving risk mitigation strategies and adapting to market dynamics.

Emergency response systems have explored the use of cognitive technologies for real-time situational awareness (Johnson et al., 2019). The theoretical integration of such

capabilities within CogniCraft could enhance decision-making during emergencies, providing critical information to responders and improving overall crisis management.

Theoretical applications of cognitive computing in customer service have been demonstrated through the use of virtual assistants and chatbots (Jurafsky & Martin, 2020). CogniCraft, theoretically guided by similar principles, could enhance user interactions, providing more responsive and personalized customer service experiences.

The theoretical exploration of potential applications for CogniCraft reveals its versatility and potential effectiveness across various real-world scenarios. The theoretical integration of cognitive computing elements, derived from secondary data, positions CogniCraft as a dynamic framework capable of revolutionizing decision-making processes and elevating craftsmanship in healthcare, manufacturing, finance, emergency response, and customer service. The examples and case studies from the literature further emphasize the theoretical potential of CogniCraft to contribute to improved outcomes and efficiencies in diverse domains. However, empirical validation and practical implementations are essential to translate these theoretical constructs into tangible impacts.

4.4. Challenges and Future Directions:

The exploration of cognitive computing frameworks, exemplified by CogniCraft, unveils a landscape fraught with challenges and limitations, as well as promising directions for future research. Insights gleaned from the literature shed light on multifaceted challenges, encompassing technical, ethical, and practical dimensions. Addressing these challenges is crucial for harnessing the full potential of cognitive computing in real-time craftsmanship.

One significant challenge identified in the literature pertains to the interpretability and transparency of cognitive systems. As cognitive computing involves complex algorithms and intricate models, understanding the decision-making process becomes a formidable task. The black-box nature of some cognitive systems can hinder user trust and acceptance. Future research should focus on developing methodologies and interfaces that enhance the interpretability of cognitive frameworks, ensuring that end-users and stakeholders can comprehend and trust the insights and decisions generated by these systems.

Another challenge revolves around the ethical implications of cognitive systems. Bias in data and algorithms, as well as potential discriminatory outcomes, are critical concerns that need to be mitigated. Ethical guidelines and frameworks are essential to govern the development and deployment of cognitive systems, ensuring fairness, accountability, and transparency. Future research should delve into refining and expanding ethical considerations, establishing industry-wide standards that promote responsible and unbiased use

of cognitive computing in real-time decision-making.

Scalability and adaptability pose substantial challenges for cognitive computing frameworks, particularly in real-time applications. As the volume and velocity of data continue to escalate, cognitive systems must be equipped to handle diverse and dynamic datasets seamlessly. Ensuring scalability while maintaining real-time responsiveness demands novel approaches and optimizations. Future research should explore innovative architectures and algorithms that enhance the scalability and adaptability of cognitive frameworks, allowing them to thrive in dynamic and data-intensive environments.

Practical implementation challenges are also prevalent, ranging from resource constraints to integration complexities. Real-world deployment of cognitive systems often encounters resistance due to high implementation costs, lack of expertise, and resistance to change. Future research should emphasize practical strategies for overcoming implementation barriers, including cost-effective deployment models, user training programs, and strategies for integrating cognitive frameworks into existing systems seamlessly.

On the horizon of future directions, there are compelling avenues for research that can augment the effectiveness of cognitive computing frameworks in real-time craftsmanship. One promising direction involves the incorporation of explainable AI (XAI) techniques to enhance the interpretability of cognitive systems. By integrating XAI methodologies, researchers can develop models that not only provide accurate results but also offer transparent insights into the decision-making process, bridging the gap between complex algorithms and human understanding.

The integration of machine learning interpretability tools and visualization techniques can contribute to making cognitive systems more accessible and user-friendly. This approach aligns with the broader goals of user-centered design, where the end-user's comprehension and acceptance of the system are prioritized. Incorporating human factors and usability studies in future research can provide valuable insights into designing cognitive frameworks that align with user expectations and cognitive capabilities.

Enhancements in the ethical framework governing cognitive systems are pivotal for ensuring responsible and unbiased use. Future research should delve into refining existing ethical guidelines, developing tools for auditing algorithms for bias, and fostering collaboration between interdisciplinary teams to address ethical considerations comprehensively.

In terms of scalability and adaptability, future research

should explore advanced architectures, such as federated learning and edge computing, to distribute cognitive processing and enable real-time decision-making at scale. These innovations can address the challenges posed by the growing volume of data and the need for cognitive systems to operate in diverse and dynamic environments.

Practical implementation challenges can be tackled through comprehensive change management strategies, emphasizing user education, stakeholder engagement, and phased deployment models. Future research should provide practical frameworks and toolkits for organizations to navigate the complexities of implementing cognitive systems effectively.

The challenges identified in the literature regarding cognitive computing frameworks for real-time craftsmanship necessitate ongoing research efforts. The proposed future directions emphasize the importance of enhancing interpretability, refining ethical considerations, addressing scalability issues, and streamlining practical implementations. By tackling these challenges and exploring innovative research directions, the field can advance toward realizing the full potential of cognitive computing in real-time decision-making processes.

5. Conclusion

In culmination, the theoretical exploration of CogniCraft and its potential applications for advancing real-time craftsmanship reveals a landscape rich with possibilities and theoretical significance. The analysis, grounded in insights from secondary data encompassing cognitive computing frameworks, real-time decision-making, and craftsmanship improvement, underscores several key theoretical findings that contribute to the evolving discourse in the field.

CogniCraft's theoretical architecture, as conceived through insights from the literature, envisions a dynamic framework that integrates essential cognitive computing elements. The data processing module, theoretically designed for real-time ingestion and preprocessing, underscores the framework's capacity to handle

the velocity and variety of contemporary datasets. The machine learning algorithms, grounded in advanced pattern recognition, theoretically empower CogniCraft to distill meaningful insights from complex and evolving data, enhancing the precision and adaptability of decision-making.

The decision engine, theoretically imbued with cognitive capabilities, stands as a linchpin for ensuring effective real-time decision-making within CogniCraft. The contextual awareness embedded in this module theoretically enables the framework to navigate the intricacies of dynamic operational environments. The adaptive interface, inspired by user-centric design principles, theoretically promises to

enhance user interactions, ensuring a seamless and intuitive engagement with the cognitive system.

The theoretical applications of CogniCraft across diverse domains further underscore its potential significance. In healthcare, the framework theoretically contributes to diagnostic precision, personalized treatment planning, and advancements in medical research. In manufacturing, the real-time adaptability of CogniCraft theoretically optimizes production processes, predicts equipment failures, and streamlines supply chain logistics. The financial sector theoretically benefits from enhanced data analysis, risk management, and adaptability to market changes. Emergency response systems theoretically leverage CogniCraft for improved real-time decision-making during crises, while customer service experiences are theoretically transformed through personalized and efficient interactions.

The theoretical comparisons with existing frameworks or traditional methods accentuate CogniCraft's potential advantages in terms of agility, adaptability, and cognitive intelligence. The integration of machine learning algorithms, real-time processing capabilities, and user-centric design principles theoretically positions CogniCraft as a transformative force in advancing real-time decision-making and craftsmanship improvement.

Theoretical examples and case studies from the literature further emphasize CogniCraft's potential effectiveness in real-world scenarios. The theoretical integration of cognitive computing elements, derived from secondary data, positions CogniCraft as a dynamic framework capable of revolutionizing decision-making processes and elevating craftsmanship in healthcare, manufacturing, finance, emergency response, and customer service.

However, the theoretical exploration also unveils challenges and limitations that warrant attention in future research. Challenges related to interpretability, ethical considerations, scalability, and practical implementation complexities are critical facets that demand ongoing theoretical and empirical investigation. Future research directions, as proposed, focus on addressing these challenges, refining ethical frameworks, enhancing interpretability through explainable AI techniques, and exploring innovative architectures for scalability.

The theoretical significance of CogniCraft in advancing real-time craftsmanship through cognitive computing lies in its potential to usher in a new era of intelligent decision-making. The framework's theoretical architecture, applications across diverse domains, and theoretical comparisons with existing methods collectively underscore its potential transformative impact. The challenges identified present avenues for future research, where theoretical advancements can be translated into practical solutions, fostering responsible and effective deployment of

cognitive computing in real-time decision-making processes. As we navigate this theoretical landscape, CogniCraft emerges as a promising theoretical framework poised to shape the future of real-time craftsmanship through its cognitive capabilities.

6. RECOMMENDATION

Recommendations for future research and practical implementation of CogniCraft center on addressing identified challenges, refining theoretical constructs, and fostering responsible deployment. Firstly, future research should focus on empirically validating the theoretical constructs of CogniCraft in real-world settings. Rigorous testing across diverse domains will provide insights into the framework's practical efficacy, addressing challenges related to interpretability, scalability, and ethical considerations. Collaboration with industry partners can facilitate the integration of CogniCraft into operational environments, providing valuable feedback for refinement.

Additionally, a continued exploration of ethical considerations is crucial. Developing and refining ethical guidelines, tools for bias detection, and frameworks for responsible AI deployment will be imperative to ensure the ethical use of CogniCraft. Moreover, future research should emphasize user-centric design principles, incorporating feedback from end-users to enhance the adaptability and acceptance of the framework.

Practical implementation recommendations involve phased deployment strategies, considering resource constraints and organizational readiness. Training programs for users and stakeholders will mitigate resistance to change, fostering a smoother integration of CogniCraft into existing systems. Overall, the recommendations aim to bridge the gap between theoretical constructs and practical impact, guiding the evolution of CogniCraft from a theoretical framework to a transformative tool in real-time craftsmanship.

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Conflicts of interest

The authors declare no conflicts of interest.

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