1. Explore the trends and research topics in the area of computer science.

As technology advances rapidly, it becomes increasingly important for software development and business analytics professionals to keep up with the latest trends. Emerging technologies will significantly impact these domains by 2023 (Abhishek, 2023). For instance, here are some of the critical areas and issues that are currently being explored in the field of computer science:

1. **Machine Learning and Artificial Intelligence:** Artificial intelligence (AI) and machine learning (ML) have transformed many industries. Natural language processing has given way to computer vision and predictive analytics as AI and machine learning have progressed. Understanding algorithms, deep learning frameworks, and AI ethics will be critical in realising this technology's full potential.
2. **Blockchain Innovation:** Blockchain has gotten much attention outside of cryptocurrencies. Because of its decentralised and secure nature, it is suitable for a wide range of applications, including supply chain management, healthcare, finance, and voting systems. Understanding distributed ledger technology, smart contracts, and blockchain platforms will be helpful in the ever-changing digital landscape.
3. **IoT (Internet of Things):** The IoT has altered our relationship with technology. The Internet of Things connects devices, sensors, and networks, allowing for data collection and automation. Understanding IoT protocols, data analysis, and security will become increasingly important for software developers and business analysts as smart homes, smart cities, and industrial automation become more popular.
4. **Cybersecurity:** With the rise of cyber threats and data breaches, organisations have prioritised cybersecurity. Software developers and business analysts must understand various security frameworks, encryption techniques, and vulnerability assessment. Learning about emerging technologies such as zero-trust architecture and secure coding practices will also be necessary.
5. **DevOps:** DevOps is a methodology that highlights communication and cooperation between teams responsible for software development and IT operations. Its goal is to automate the entire software development lifecycle, from development to deployment and operation. Its goal is to automate the entire software development lifecycle, from development to deployment and operation. With the growing adoption of agile and continuous delivery practices, DevOps has become critical for software developers and business analysts. Learning about DevOps tools like Jenkins, Git, and Docker, as well as infrastructure management and automation skills, will be critical in 2023.
6. **RPA stands for Robotic Process Automation:** Robotic process automation uses software robots to automate repetitive and rule-based tasks. RPA is becoming popular in finance, human resources, and customer service. Learning

RPA tools, process automation, and workflow management will be instrumental in streamlining business operations.

7. **Cloud Computing:** Cloud computing has remained a game changer in the IT industry. Remote data access and storage have transformed business operations. Cloud platform skills such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP) and knowledge of containerisation tools such as Docker and Kubernetes will be essential for software developers in 2023.

8. **Augmented and virtual reality (VR/AR):** Virtual and augmented reality technologies have already had a significant impact in several industries, including gaming, education, and healthcare. These technologies are expected to become more common by 2023, with more applications for business and consumer use being developed.

9. **Business Intelligence:** Business analytics skills will remain in high demand as businesses strive to make data-driven decisions. Professionals with data analysis, visualisation, and predictive analytics skills will be in great need in 2023.

10. **Computing at the Quantum Level:** Quantum computing is a new technology that performs complex computations using quantum mechanics principles. It has the potential to solve problems that traditional computers cannot. Although it is still in its infancy, quantum computing is expected to become a critical tool in various industries, including finance, healthcare, and logistics. Understanding quantum algorithms, quantum programming languages, and quantum cryptography will benefit this field.

In conclusion, these are the top ten trending technologies professionals in software development, and business analytics should learn in 2023. These technologies can potentially revolutionise various industries while providing exciting career advancement opportunities. Whether learning about AI and machine learning, blockchain, or quantum computing, staying current on the latest trends and learning new skills will be critical for professionals to remain competitive and thrive in the digital age.

Computer science is a rapidly evolving field with many exciting research areas and trends. As new technologies emerge and existing technologies evolve, other research areas will likely appear.

2. Identify and define a problem in the area of computer science.

One problem in computer science is the issue of software security. Software security refers to the practice of designing and developing software systems that are resistant to attacks and other forms of malicious behaviour. Despite the best efforts of software developers, software security vulnerabilities remain a significant problem, and they can lead to data breaches, theft of sensitive information, and other forms of cybercrime (Heiss, 2019).

Some common software security vulnerabilities include buffer overflow attacks, injection attacks, cross-site scripting attacks, and authentication issues. These vulnerabilities can be caused by various factors, including poor coding practices, inadequate testing, and failure to address known vulnerabilities (Malviya et al., 2013).

To address this problem, software developers must take a proactive approach to software security, including implementing best practices for secure coding, conducting regular security assessments, and using tools and technologies to help detect and mitigate vulnerabilities. Additionally, education and training programs can help raise awareness of software security issues and provide developers with the knowledge and skills to design and develop secure software systems. Overall, addressing software security is an ongoing process that requires the collaboration of developers, security professionals, and end-users to ensure that software systems are secure and resistant to attacks.

3. Propose a research question and then support the research question with adequate literature-based evidence.

Research Question: Can deep learning techniques improve the accuracy of speech recognition systems in noisy environments?

Literature-based evidence:

Speech recognition systems are widely used in various applications, such as virtual assistants, speech-to-text transcription, and voice-controlled devices. However, speech recognition systems often encounter noise interference in real-world environments that can negatively impact accuracy. Deep learning techniques have been proposed as a potential solution to this problem.

One study by Xu et al. (2014) explored deep learning techniques for improving speech recognition accuracy in noisy environments. The study used a deep neural network (DNN) to model the acoustic features of speech signals and improve noise robustness. The DNN was trained on a large dataset of clean and noisy speech signals and could learn discriminative features robust to noise interference.

The study results showed that the DNN-based approach significantly outperformed traditional speech recognition systems in noisy environments, achieving a 20% improvement in word error rate (WER) compared to a state-of-the-art system. The study also found that the DNN-based approach was particularly effective in reducing errors caused by non-stationary noise, commonly found in real-world environments.

Another study by Mohamed et al. (2011) proposed a deep learning technique called deep belief networks (DBNs) for improving speech recognition accuracy in noisy environments. The study found that DBNs could learn higher-level features of speech signals more robust to noise interference than standard features used in speech recognition systems.

Deep learning techniques have the potential to improve the accuracy of speech recognition systems in noisy environments significantly. Deep learning approaches may help overcome one of the significant challenges facing speech recognition

systems in real-world applications by learning robust features of speech signals less affected by noise interference.

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