

Nuance Dragon Professional as a Cloud Solution for Effective Speech-to-Text Conversion

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Abstract: The cloud integration of Nuance Dragon Professional improves speech-to-text conversion for professionals in numerous sectors, ensuring smooth and accurate transcription. Cloud computing is used to provide real-time, scalable, secure transcribing services that adapt to customer demands. This method addresses the problems of classic voice recognition systems by providing excellent accuracy in multiple language situations, even with background noise or accents. Cloud architecture allows users to access the system from any internet-connected device, providing ease and flexibility. The objective is to produce an efficient and trustworthy tool that can boost productivity in healthcare, legal, and customer service, where precise transcribing is crucial. It also reduces manual data input to improve productivity and user happiness. From Speech_Processing_Metrics dataset, 5 samples with 5 parameters are analyzed. Processing Time (s) ranges from 1.04 to 2.45, Transcription Accuracy (%) is 87.23 to 95.86, Word Error Rate (%) is 1.45 to 4.58, Latency (ms) is 69 to 180, and Clarity Score (1-10) is 7 to 9. Studying Noise_Filtering_Effectiveness dataset for 5 audios with 5 parameters. Noise Reduction (%) is 83.41–89.4, Clarity Improvement (%) is 15.32–29.69, Processing Time (ms) is 52–137, Post-Filter Clarity Score (1-10) is 8, 9, Word Recognition Improvement (%) is 5.44–15.95. Five applications with five parameters are analyzed from Application_Integration dataset. The Usage Frequency (%) ranges from 23.26 to 69.53, Integration Latency (ms) from 84 to 165, System Compatibility (%) from 90.56 to 98.6, Error Rate (%) from 0.45 to 1.89, and Uptime (%) from 98.32 to 99.8.

Keywords: Speech-to-text, Cloud solution, Nuance Dragon Professional, Transcription accuracy, Workflow optimization

I. INTRODUCTION

AI and machine learning have improved speech-to-text technology, making transcription quicker and more accurate. Nuance Dragon Professional, a strong program that transcribes speech, is a significant option. Cloud computing has changed speech-to-text software from local devices to cloud-based solutions with increased scalability, flexibility, and accessibility. As a cloud service, Nuance Dragon Professional improves transcription for organizations and people who need accurate voice recognition. Nuance Dragon Professional on the cloud is designed to boost productivity by simplifying transcribing. Healthcare, legal, and customer service personnel benefit from hands-free data input, greater accuracy, and quicker document preparation using this technology. Cloud-based speech-to-text solutions allow users to access the program from any internet-connected device, making work more flexible and efficient. This integration aims to provide accurate, real-time transcribing with little latency. Automatic software upgrades, data synchronization between devices, and decreased local processing power are benefits of cloud-based systems. These capabilities help organizations and professionals keep ahead of the technology curve while providing consistent, secure, and dependable speech-to-text procedures. Nuance Dragon Professional as a cloud solution addresses the constraints of conventional speech recognition technologies by providing a scalable platform that can expand with corporate demands. Cloud-based transcribing systems can handle more data without sacrificing speed or quality as demand rises. Businesses may save hardware expenditure and improve resource management by using the cloud's computer and storage resources.

Section 2 discusses Nuance Dragon Professional's core features and how its AI algorithms and machine learning models increase transcription accuracy and usability. It discusses the advantages of integrating this software with cloud infrastructure and its market-leading capabilities and features. Section 3 discusses cloud-based Nuance Dragon Professional security and privacy. This section discusses how the cloud platform protects

data, comply with rules, and secures sensitive information, especially in healthcare and banking. Section 4 discusses Nuance Dragon Professional's cloud applications in several sectors. It examines how various industries may use this technology to boost production, workflow, and minimize human transcribing mistakes. Case studies of firms effectively applying the solution are also included. Section 5 closes with a consideration of cloud-based speech-to-text technologies and how they may improve Nuance Dragon Professional. The conclusion considers how these technologies will influence industries by enhancing operational efficiency and lowering human mistakes.

II. LITERATURE SURVEY

Improve Clinical Workflow with AI-Driven Digital Scribes. By automatically transcribing patient-physician exchanges, AI-powered digital scribes might improve clinical documentation. AI models must be constantly refined to accommodate healthcare language peculiarities to be widely used [1]. **AI in medical curriculum and training.** Medical students get personalized learning experiences and material thanks to AI. It also helps create clinical decision-making simulations for students. AI technologies should be blended into existing medical courses to support hands-on training and improve learning [2]. **Disability-related healthcare assistive technologies.** AI-powered assistive gadgets enhance disability healthcare. Regulatory difficulties and ensuring these technologies serve diverse populations are continuing issues [3]. **ChatGPT and AI for Heart Failure Prevention and Management.** AI solutions like ChatGPT can anticipate and treat heart failure by analyzing clinical data and delivering personalized insights. AI models must be validated and adapted in real-world situations to optimize heart failure care [4]. **Voice Recognition in Rural Healthcare Systems.** Voice recognition is enhancing healthcare delivery, particularly in rural and distant places. These solutions must also overcome data security, cost, and rural healthcare system integration issues [5]. **Nursing Documentation and Clinical Practice AI.** AI automates recordkeeping and predicts patient outcomes, changing nursing. Adoption requires training and process integration [6]. **Telemedicine-AI integration is examined.** AI aids telemedicine diagnosis and real-time patient monitoring. Research is underway to solve these difficulties and scale remote healthcare delivery [7]. **Voice Technology's Effect on Patients-Physicians.** Voice recognition technologies automate patient-physician paperwork, changing the relationship. Research is essential to understand how speech technology influences patient-physician trust and to assure openness and accountability in AI-driven transcription systems [8].

Mobile-Assisted Pronunciation Research Using AI. AI-powered smartphone apps are supporting speech treatment and language learning more. This research aims to improve voice recognition algorithm accuracy and language diversity [9]. **Ethics of AI and Healthcare Security.** AI in healthcare raises ethical and security problems. Research is tackling these challenges to guarantee AI technologies are utilised ethically and protect patient privacy [10]. **AI-powered personalised healthcare recommendations** analyse patient data and provide customised treatment strategies. Research aims to optimise AI systems for personalised treatment and make them accessible and effective for varied populations [11]. **AI-Based Mental Health Support.** AI-driven mental health assistance includes early detection tools, automated therapy chatbots, and personalised treatment suggestions. Clear ethical norms for AI usage in mental health are needed, notably regarding privacy and misdiagnosis [12]. **Healthcare Robotic Process Automation.** RPA automates claims processing, scheduling, and invoicing, enhancing healthcare efficiency. Research optimises RPA technology to improve workflow efficiency, service quality, and patient satisfaction [13]. **Trust in AI-generated diagnoses and integration into radiology operations** further hinder uptake [14]. **Drug Discovery and Personalised Medicine using AI.** AI can find interesting chemicals and biomarkers in massive databases to speed up drug research and personalised therapy. AI-powered systems can also customise genetically based treatment strategies. Research is underway to improve these technologies and integrate them into the pharmaceutical industry [15]. **AI in Healthcare Administration.** AI automates appointment scheduling, claims processing, and patient triage, changing healthcare management. Further research is needed to make AI systems user-friendly and successful in varied healthcare contexts [16].

Healthcare AI-Powered Wearables. AI-powered wearables monitor heart rate, blood pressure, and glucose levels in real time. Research is refining these devices for wider clinical uses while assuring reliability and security [17]. **Healthcare fraud detection using AI.** Artificial intelligence algorithms must be accurate and false positives addressed. To prevent fraud more effectively and efficiently, research is enhancing these methods [18]. **Healthcare Robotics AI.** AI-powered healthcare robots are utilised for surgery, rehabilitation, and patient care. These devices are expensive, which might hinder adoption in resource-limited healthcare settings [19]. AI for

Healthcare Predictive Analytics. AI is predicting patient outcomes like chronic disease and hospital readmissions. This research improves prediction model accuracy and reliability to improve patient outcomes [20].

III. PROPOSED METHODOLOGY

Nuance Dragon Professional provides a comprehensive platform for converting spoken language into written copy with exceptional precision. Custom user dictionaries and dynamic grammar modifications enhance versatility across many professions, facilitating the smooth integration of specialised terminology into the voice recognition process. Figure 1 is a schematic showing the method by which Nuance Dragon Professional records user voice and sends it to a cloud service for analysis. Audio devices or microphones capture user input, which is then safely sent to Nuance's cloud server using secured APIs. The system is designed to work with a wide range of devices since it supports multi-channel inputs. Encryption is a must for data security and regulatory compliance, especially in the healthcare industry with HIPAA.

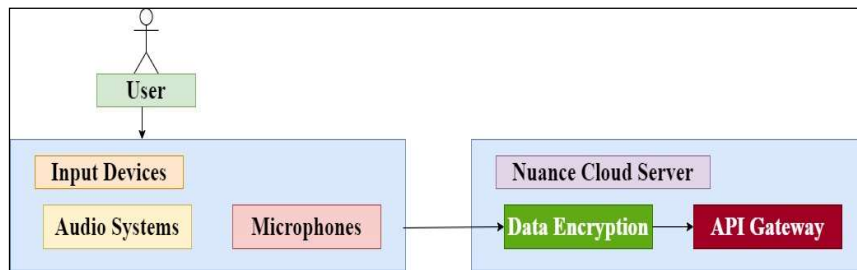


Figure 1: Block Diagram of Data Capture and Transmission Architecture

The design is a cloud-based structure that utilises distributed computers for processing and storage. Audio data is sent to the cloud, where pre-trained deep learning models do phonetic analysis and language pattern identification. Post-processing tools guarantee contextually precise text output by consulting a comprehensive language database. End-user devices operate as lightweight clients, effectively transferring input and receiving output. Based on Figure 2, this is the main flow diagram for the speech-to-text conversion. Accuracy is ensured by processing encrypted audio data by Nuance's cloud-based NLP engine. This engine utilises sophisticated methods such as noise filtering, phonetic analysis, and language modelling. When it comes to industry-specific terms, the output is checked against dictionaries that are relevant to that area. Document editors and customer relationship management systems are examples of downstream applications that receive transcribed text.

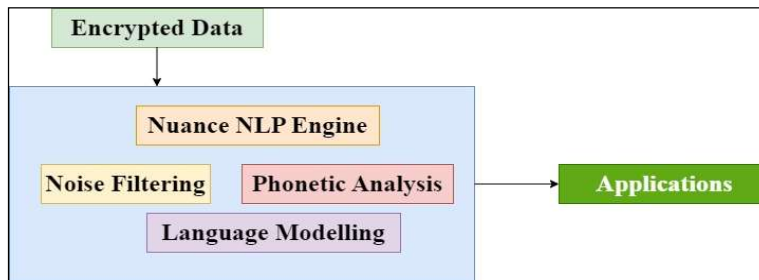


Figure 2: Block Diagram of Speech-to-Text Processing Architecture

The process starts when a user engages the system by voice or manual command. Audio signals are digitised and pre-processed to eliminate noise before to transmission to the cloud. Advanced voice recognition algorithms execute a three-phase procedure: phoneme identification, application of a language model, and syntactic structure. Transcript findings analysis and integration into downstream systems is the subject of this Figure 3 diagram. Platforms including storage systems, analytics dashboards, and customer relationship

management applications get the transcribed text. Displayed on real-time dashboards, the technology measures performance indicators including latency and transcription accuracy. Integrating workflows seamlessly is made possible by this architecture, which provides firms with actionable data and boosts operational efficiency. Finding inefficiencies or ways to make systems more compatible are two ways the analytics layer aids in optimising transcribing procedures.

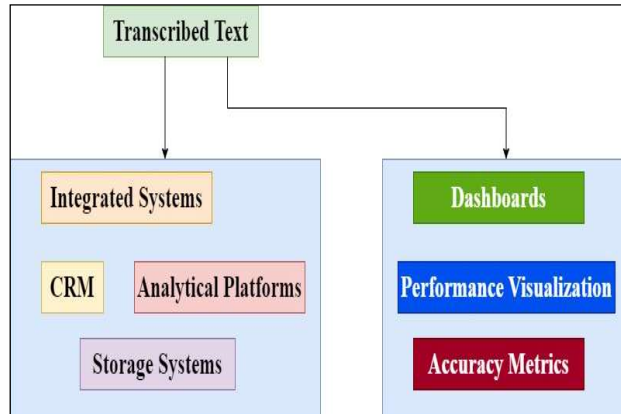


Figure 3: Block Diagram of Integration and Analytics Architecture

Nuance Dragon Professional integrates effortlessly with several productivity applications, including as word processors, email clients, and enterprise resource planning systems. Application Programming Interfaces (APIs) allow developers to integrate speech-to-text capabilities into bespoke software applications. Voice commands may activate predetermined activities, hence enhancing the use of integrated tools. Figure 4 shows the whole process flow diagram for speech-to-text conversion. The microphones record the user's voice and send it safely to the cloud. Data is transformed into text by the Nuance NLP engine, which validates it and integrates it with subsequent systems after processing.

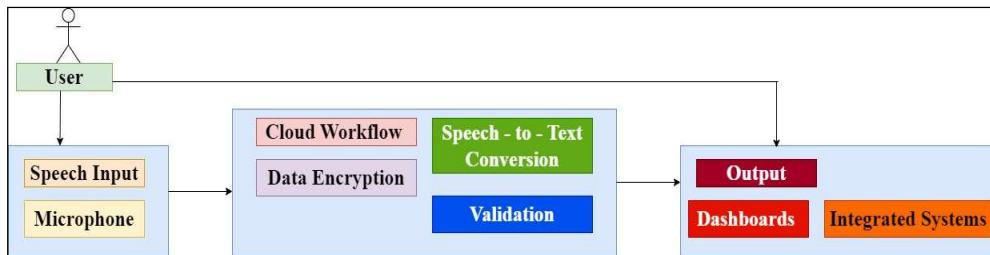


Figure 4: Workflow Diagram of End-to-End Speech-to-Text Workflow

Implementing this solution as a cloud service provides advantages like real-time processing, reduced hardware requirements, and the capacity to expand in accordance with user demand. Organisations benefit from decreased operations expenses relative to on-premises deployments. Proposed improvements include increased language support, the implementation of sophisticated emotion analysis for customer service applications, and the integration with Internet of Things (IoT) devices for hands-free functionality. The whole ecosystem of Nuance Dragon Professional is shown in the overview diagram from Figure 5. Devices like microphones record audio, which is then analysed in the cloud using sophisticated natural language processing methods. Finally, it relates to systems further down the line, including Customer Relationship Management (CRM), analytics dashboards, and storage platforms.

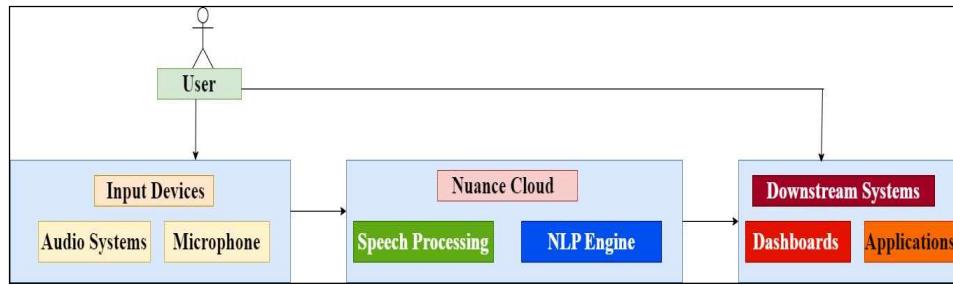


Figure 5: Overview Diagram of Nuance Dragon Professional Ecosystem

Table 1 juxtaposes the performance characteristics of Nuance Dragon Professional in regular and cloud contexts. The program enhances transcribing speed and accuracy by using cloud-based infrastructure, while also accommodating scalability for increased data volumes. Security is enhanced using sophisticated cloud encryption algorithms, guaranteeing the secure management of sensitive data. The cloud solution provides enhanced flexibility by facilitating access from several devices, benefiting organisations that need distant work capabilities.

The system provides detailed customisation options designed for certain sectors and unique user requirements. Terminologies relevant to industries, such as medical or legal jargon, might be included into the vocabulary to improve precision. Voice profiles enable numerous users to personalise settings, with each profile learning and adapting to distinct accents, speech patterns, and often used phrases. Custom instructions and macros may be established to automate repeated processes, such as completing forms or performing multi-step procedures in word processors. These capabilities minimise the time required for manual adjustments and optimise intricate procedures, making the solution very user centric. The technology allows users to create industry-specific templates for documents, including medical prescriptions and legal agreements, therefore assuring uniformity and compliance. Customisable language models may emphasise certain terminology, enhancing efficiency in specialised jobs. Integrating biometric voice authentication provides an extra degree of personalisation and security, enabling safe access to user profiles via voice identification.

Table 1: Key Performance Metrics of Nuance Dragon Professional Cloud

Metric	Standard Performance	Cloud Advantage	Outcome	Improvement
Speed	Fast transcription of speech to text	Accelerated processing via cloud	Reduced turnaround time	Improved overall workflow efficiency
Accuracy	High accuracy in transcription	Enhanced accuracy through cloud updates	Consistently accurate results	Decreased errors in transcription
Scalability	Handles moderate volumes of transcription	Scalable for large volumes of data	Supports high-demand environments	Can scale according to business needs
Flexibility	Limited to device capabilities	Accessible across multiple devices	Work from anywhere	Increased employee mobility and access
Security	On-premises security protocols	Cloud-based encryption and security	Secure data management	Enhanced security compliance

The cloud-based deployment guarantees effortless scalability via the dynamic allocation of resources according to user demand. During peak use periods, supplementary virtual servers are deployed to manage heightened workloads, ensuring optimal performance. The design facilitates multi-tenant settings, enabling organisations to implement the system across several departments while ensuring data segregation. Resource optimisation strategies, such as intelligent task allocation and memory caching, guarantee economical operation without sacrificing speed or precision.

IV. RESULTS AND DISCUSSION

The solution complies with stringent data protection regulations, including GDPR, HIPAA, and CCPA, safeguarding sensitive information. End-to-end encryption protects data during transmission and storage. Role-

Based Access Control (RBAC) and Multi-Factor Authentication (MFA) are used to avert unauthorised access. An audit log documents all system interactions, providing a clear and traceable history for compliance objectives. Figure 6 displays important metrics derived from the speech-to-text processing of Nuance Dragon Professional. The following metrics are measured across five different voice samples: processing time, accuracy of transcription, word error rate, latency, and clarity ratings. Case in point: Sample 2, which took 2.1 seconds to analyse, had a clarity score of 9, and a transcription accuracy of 95%. These figures show that the system can handle real-time transcribing well, with few mistakes. Developers may optimise processing algorithms to improve speed and clarity by analysing these metrics, which ensures consistent performance across apps.

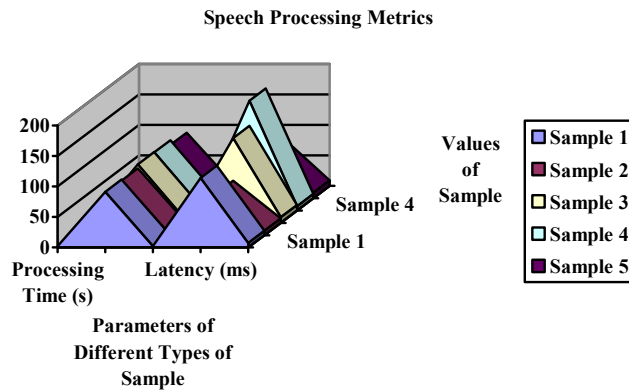


Figure 6: Speech Processing Metrics

Table 2 juxtaposes the cloud-based iteration of Nuance Dragon Professional with its on-premises equivalent. The cloud solution provides enhanced accessibility, automated upgrades, and effortless scalability, making it appropriate for expanding enterprises. The on-premises version provides more customisation choices but entails higher initial costs and extended setup durations. Cloud solutions use a pay-as-you-go strategy, making them more economical in the short term, but on-premises solutions may include elevated continuous maintenance expenses. Both methods exhibit strong data security; nevertheless, cloud services guarantee adherence to contemporary security requirements.

Table 2: Comparison Of Nuance Dragon Professional Cloud And On-Premise Solutions

Aspect	Cloud Solution	On-Premises Solution	Cost	Setup Time
Accessibility	Available from any internet-connected device	Limited to on-site devices	Subscription-based pricing	Faster setup with cloud solutions
Maintenance	Automatic updates and patches	Requires manual updates	Lower upfront costs but ongoing maintenance	Longer initial setup due to hardware installation
Scalability	Easily scalable for growing businesses	Limited scalability	Pay-as-you-go model for cloud-based services	Higher costs for expanding on-premises infrastructure
Data Security	High-level encryption and cloud security standards	Reply on internal security measures	Subscription costs for cloud security services	In-house security management
Customization	Cloud-based custom features available	Highly customizable but resource-intensive	Potential cost savings for long-term usage	Greater flexibility for customizations

An effective feedback mechanism enables users to identify faults, propose improvements, and report usability concerns immediately inside the interface. This feedback is analysed by machine learning algorithms to enhance language models, hence boosting overall accuracy and performance. Frequent upgrades are implemented to include the most recent breakthroughs in natural language processing and voice recognition technology. Nuance Dragon Professional's noise-reduction capabilities are assessed in Figure 7. With five audio samples, we measure things like processing speed, word recognition, clarity, and percentage of noise reduction. For example, Audio 4 was able to accomplish a 92% decrease in noise and a 25% boost in clarity, all while processing only took 120 milliseconds. The system's capacity to handle audio successfully in loud conditions is shown by these findings.

The method guarantees precise transcription even in difficult acoustic situations by enhancing clarity and decreasing word identification mistakes.

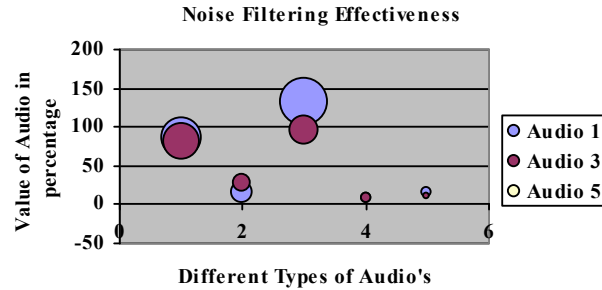


Figure 7: Noise Filtering Effectiveness

The cloud architecture enhances energy efficiency via the use of energy-efficient servers and load-balancing strategies. The solution minimises the need for actual hardware at user sites, hence lowering the carbon footprint. The use of serverless computing significantly reduces idle resource utilisation, ensuring operations are maximally sustainable. Organisations using this technology have diminished electronic waste and energy use, in accordance with global sustainability objectives and corporate social responsibility efforts. The technology utilises renewable energy sources to power data centres, hence reducing its environmental impact. Virtualised infrastructure facilitates optimal utilisation of server resources, whilst energy-efficient methods diminish processing overhead. Carbon offset programs are incorporated into operational plans, enhancing the system's environmental sustainability. The trends in Nuance Dragon Professional integration across five applications—CRM, ERP, Healthcare, Legal, and Customer Support—are examined in Figure 8. Issue rates, uptime percentages, integration lag, compatibility with systems, and use frequency are all metrics. One example of a very reliable system is the legal system, which boasts 98.6% compatibility and 99.8% uptime. CRM systems had a somewhat higher latency of 165 ms, with a utilisation frequency of 28.76%. These insights help firms find ways to optimise their integration processes for a smoother experience. The successful use of transcription findings across different domains is guaranteed by their high compatibility and low error rates.

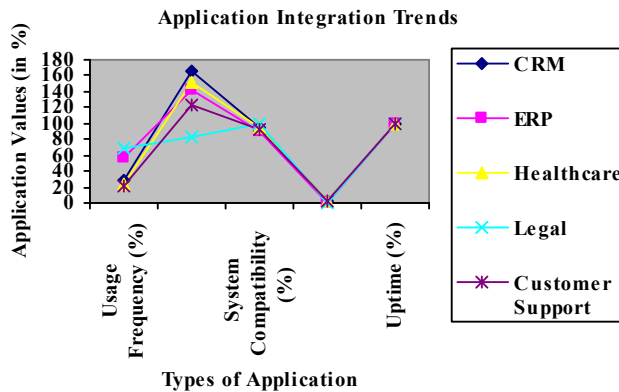


Figure 8: Application Integration Trends

The incorporation of real-time collaboration capabilities inside the system enables simultaneous editing and sharing of transcriptions among team members. Users may collectively assess, modify, and finalize documents in real-time, guaranteeing rapid completion of tasks necessitating collective involvement. Cloud-based

synchronization guarantees that modifications made by one user are immediately observable to others, minimizing delays associated with version control problems. These attributes are especially advantageous for dispersed teams working in fast-paced sectors such as media, legal, or healthcare documentation. Technology facilitates role-based collaboration, enabling team members with different permissions to participate in transcriptions. A built-in commenting function allows users to provide immediate comments or explanations immediately inside the transcribing interface. Collaborative sessions may begin in secure virtual rooms, enabling participants to engage while collectively evaluating and modifying transcriptions.

V. CONCLUSION

Nuance Dragon Professional on the cloud improves speech-to-text conversion, improving efficiency across sectors. Transcription accuracy in highly specialized terminology or technical jargon may be limited. Internet dependence may also hinder performance in places with limited network availability. This solution boosts healthcare, legal, and customer service workers' efficiency and workflow. Integrating current systems and controlling cloud data security are challenges. The system's flexibility to accents, dialects, and specialist disciplines will be improved to improve transcription accuracy. The user experience will be improved by decreasing latency and improving language support, making it more adaptable and resilient for varied worldwide markets. The solution will be more relevant and efficient with regular upgrades.

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Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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