CLOUD-BASED VOICE RECOGNITION SECURITY SYSTEM

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OBJECTIVE

- Develop a cloud-based voice recognition system that identifies BECU members as they speak with an employee at a Neighborhood Financial Center in the United States.
- Real-time voice recognition from captured audio streams.
- Provide a second layer of authentication (after PIN verification) that strengthens security, reduces caller fraud, and maintains operation efficiency.

SYSTEM OVERVIEW & WEB DEVELOPMENT

- Implemented with Azure Static Web Apps
- Built the website with HTML5, CSS3, and JavaScript.
- Audio Capture System: MediaStream API (2) for recording and streaming audio data.
- Azure Speaker Recognition API (4) in JavaScript.
- Audio Function (3) in Python.
- Authenticates new and existing members within 30 sec with >80% confidence level.
- Used accessible microphones to capture live audio streams and perform real-time voice recognition.

ADMIN PORTAL

- Admin Login Page: Allow BECU employees to sign into admin portal.
- Add New Customer Page: Register customers and enroll voice signatures.
- Customer Database Page: Verify customers with security questions and voice recognition.

BACK-END: DATABASE

- Implemented with Azure SQL Database [5]
- Stores customers information when they are enrolled for the first time.
- Stores employee credentials and system performance metrics.
- Connects with Azure Cognitive Services to store the Voice Profile ID generated to verify the customer.

BACK-END: API

- Builds the web API with a RESTful and serverless architecture.
- Handles HTTP requests using HTTP trigger function.
- Responds to database transactions with pyodbc package.
- Creates and fetches customer information and voice profile ID for voice recognition.
- Updates and retrieves voice recognition system performance statistics.

REFERENCES


CONCLUSION & FUTURE WORK

Our team successfully:
- Developed a web application to achieve a cloud-based voice recognition solution.
- Authenticated new and existing members within 30 sec with >80% confidence level.
- Used accessible microphones to capture live audio streams and perform real-time voice recognition.
- Deployed Microsoft Azure resources for effective and secure cloud-based functionalities that can be easily integrated with BECU’s existing infrastructure and flexible to scale up.

Future Goals:
- Explore Blockchain as an alternative to SQL database.
- Further test the MS Speaker Recognition API against a more diverse, large dataset.

MACHINE LEARNING RESULTS

Our team tested the accuracy of the voice recognition system in quiet and noisy environments. The threshold for rejecting a voice recognition was set at 70% confidence level. The results showed an average accuracy of 95%.

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