

# LingoPros

#### AuToBI Toolchain and Web Hosted Analyzer

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### Speech Analysis

What is speech analysis?

- Measuring prosodic features
- Language Proficiency

Prevalence of Automatic Speech Recognition



https://www.fel.cvut.cz/en/vv/tymy/sami/11.jpg



#### Dr. Okim Kang and Dr. David O. Johnson

Applied Linguistics Speech Lab

- Native vs Non-native English speakers
- Difficulty annotating audio samples
- Developed their own speech analyzer: The David Brazil Model







### The Brazil program

- Slow and inconvenient to use.
- Client wants the program to be accessible online



#### AuToBI Problem

Standard framework using Tones and Break Indices (ToBI) model

- Brazil vs ToBI Model
  - Experimental vs Standard
- Issues:
  - Brazil criticized for not being the standard in speech analysis
  - No current proficiency analyzer to compare with

#### **David Brazil Model Solution**



#### AuToBI Solution



### David Brazil Requirements

- Upload phone file
- Web Server
  - User Login
  - Admin page for verifying users
  - Results are displayed from the server-side application.
- Program hosted on server for designated users
  - Locally at a minimum

### AuToBI Requirements

- Run AuToBI analysis with multiple files
- Feature selection
- Machine Learning on features
- Calculate proficiency score

#### **David Brazil Website Implementation**

serverOperations							
inputPhoneFile: File							
start.m: File							
outputFromDBM: File							
resultsPugPage: File							
storeFile(File): void							
generateMATLabStartFile(File): File							
runDBMAnalysis(File): File							
generateResultsPage(): void							
stylizeAnalyzedData(File): File							
cleanServerAnalysis(): void							

#### AuToBI Toolchain Implementation

autobiRunner	wekaRunner	NeuralNet
audioFilePath: String	useLowLevel(Instances): int[]	number_nodes: int
model: String	buildMeanArrav(File, int[]); double[]	input_layer: double[]
outputFilePath: String	frequencyCount(File[1); int[1); int[1	w_mean_array: double[][]
analyzerType: String		initializeNet(): void
setInputAudioFile(FilePath):void		nonlin(double): double
setAnalyzer(String): void		processInput(double[], int)
setOutputFile(File): void		testInput(double[], int)
setModel(String):void		
runAuToBIAnalysis(FilePath)		

### Challenges and Resolutions

To Us:

- Failure to complete full David Brazil Analysis locally.
- Failure to create MATLab runtime environment on the DigitalOcean Box
- Feature selection
- AuToBI file generation attribute error and data mismatch

To Client:

• Digital Ocean hosting fee.

#### SEMESTER SCHEDULE:

Feb w8 o 19-25	Mar w9 Mo 26-4	Mar w10 Mo 5-11	Mar w11 Mo 12-18 Prototype DUEI	Mar w12 Mo 19-25	Apr w13 Mo 26-1	Apr w14 Mo 2-8	Apr w15 Mo 9-15	Apr w16 Mo 16-22	Apr w17 Mo 23-29	
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	AuToBI Com	plete								

#### Conclusion

- Website
  - David Brazil Model- Dr. Okim's Program.
    - Slow, inconvenient, inaccessible
  - Audio files are analyzed online
- AuToBI Machine Learning Program
  - Use AuToBI output to pass to a Java API for feature selection
  - Pass to a neural network to calculate proficiency score



## Thank You

Joshua Shaffer - jls865@nau.edu, Luis Montes, Matt Quintana, and Erik Strauss