Please make a copy of this document and include this in your GitHub repository for your submission, using the tag #AndroidDevChallenge

Tell us what your idea is.

I noticed that a lot of, if not all, blind users I know have troubles to use the Talkback gestures. My idea is to create an accessibility service that use voice as a new communication interface. This service is not meant to replace talkback. This is more a "talkback companion" which will manage the interactions between the visually impaired user and the system. For instance, the service can be used to start an app with a voice command but the app accessibility will remain to Talkback.
Before I start to write the service, I built a framework based on the Android native API, for which I request your help.
This framework provides a set of methods to build vocal interfaces I will use in my service. A pre-release version is already available for testing but it needs some improvements before being put in the accessibility service. So far it misses some intelligent functions like the wakeup word detection and it is doing only keywords spotting. I want to add a wakeup word detection and to replace the keyword spotting with an open speech algorithm. This imply the use of Machine Learning to create models that run on premise to do the NLP / NLU and the wakeup word detection.
That's why I enter in this challenge with the hope that Google's engineers will help me to create the future of the accessibility that will improve and ease the way disabled people use their devices.

Tell us how you plan on bringing it to life.

Current Status

The framework has already the low-level code to carry out the speech recognition and the text to speech. I used the native functions of Android (SpeechToText and SpeechRecognizer). On top of them I created an architecture based on listeners to trigger customs action based on the keywords detection. The goal was to have a framework the most modular as possible in order to reuse it in different use cases. To simplify the keywords detection, I created a very simple algorithm that will detect the presence of the keywords in a sentence. This works well but the drawback is that the exact keyword needs to be in the sentence. This code is protected so to make it usable in a third part app, I wrapped it within a class that serves as interface between the app and the internal functions.

Next Steps

Create The NLP / NLU function:
The next step is to replace my keyword detection algorithm with a real open speech algorithm which is able to do basic NLU. I started to evaluate several options. Word2vec could be a good approach, unfortunately both CBOW and SG are not suited for my needs because both are working at the semantic level.

Create The Wakeup Word Detection:
I tested the wakeup word detection with pocketsphinx but I was not happy with the results and I would like to avoid to use third party librairies as much as possible to reduce the risk of compatibility issues.
So far my only option seems to be a MFCC + RNN detection.

Once the two steps above will be added in the framework, it will be tested and released on github.

List Of Code Already Available

Pre-release version of the framework:
https://github.com/PasitheaSoftware/PASITHEA

Sample code of the actual framework:
https://github.com/PasitheaSoftware/PASITHEA_FULL_SAMPLE_CODE

Google's Help

I would like to have Google's help to:

- *Provide me guidance to create my algorithms*
- *Provide my guidance to build my neural network models*
- *Provide me guidance to train my models (transfer learning)*
- *Provide me datasets for the specific languages to train my models*

Project Timeline

Today to Feb 2020: Creation of the intelligent functions
Feb 2020 to Apr 2020: Integration of the functions in the framework
Apr 2020 to 1st of May: Tests
1st of May: Framework release

Tell us about you.

I started doing Android development 2 years and a half ago. Before that I was Solution architect and support engineer for big tech company (SUN Microsystems, Hitachi Data Systems).
I have no other projects already released but I'm working on several side projects associated with the framework.
I'm building a new articles reader app for a customer. This app will allow blind people to access to news articles of this customer and to being able to navigate in and between articles with vocal commands.
I write a music player based on the same model than the news article reader. This player will allow the vocal navigation between the music available on the device.
Beside the framework I'm also working on the vision and I started to write an app using the ML toolkit to perform text extraction from a picture and to read it aloud. This project is not a commercial project but it has been asked to me by a school to help non-French speaker kid to learn French.

Next steps.

- Be sure to include this cover letter in your GitHub repository
- Your GitHub repository should be tagged #AndroidDevChallenge
- Don't forget to include other items in your GitHub repository to help us evaluate your submission; you can include prior projects you've worked on, sample code you've already built for this project, or anything else you think could be helpful in evaluating your concept and your ability to build it
- The final step is to fill out this form to officially submit your proposal.