NameSayer

Pronunciation Assistance Software

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***Abstract*—This report outlines the development and functionality of NameSayer, desktop Java application aimed at helping the user to learn of various names. The core audience of the application are University's Deans, preparing to announce student's names on the Graduation day. The report discusses the design choices, development processes, quality assurance techniques, and a brief overview of teamwork in this project.**

***Index Terms*—audio, database, GUI, design, linguistics, pronunciation**

I. Introduction

As the main part of the Software Engineering Design 1 course, my project partner and I were contracted to develop a helpful name pronunciation app: NameSayer with the purpose of assisting the target user in correct pronunciation of unfamiliar names. The audience we aimed the app at is the Deans of University's faculties who have to announce student's names on their Graduation. Many of the students come from various ethnic backgrounds and it may be unclear for an English speaker how to pronounce their names correctly.
Having Dean as a target user carries certain implications on the design of the app: the color pallete has to be conservative and the user interface should be intuitive, minimalistic and concise.
The list of required basic features was given to us by the main stakeholder, SoftEng 206 coordinator, Dr Catherine Watson. This list includes but not limited to: recording user attempts, comparing the recording attempt with the database example, uploading an external playlist in .txt format, marking bad recordings, etc.
In addition to the fundamental features we have implemented SmartSearch for navigation of the database, ability to upload an external databases, volume control and access to different versions of a name.

II. Graphical User Interface of NameSayer

A. Programming Language of Choice and Used Packages

1) Choice of a Language: Our team had no doubts in deciding which programming language to use, as both of us are the most proficient in Java. There are other arguments towards the use of Java such as its support for Bash scripts, robust object orientation, wide variety of external open source libraries, and ease of future modification, allowing to build future versions of NameSayer incrementally and scale it up for a wider audience.

2) Libraries: There are various APIs available for use in GUI development of Java applications. The two most widely used ones are Swing and JavaFX. After the initial design meeting our team decided to utilize JavaFX library in development of NameSayer due to its greater intuitiveness and ease of use in comparison to Swing, which, from our experience with past projects, is significantly harder to get proficient at.
Consequently, we used SceneBuilder utility which provides visual interface to building GUI, making it faster to create prototypes and easier evaluate design choices.

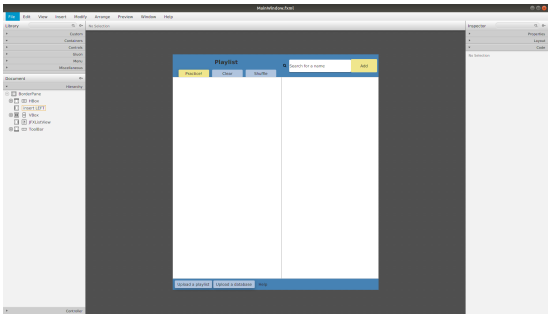

Fig. 1. SceneBuilder interface

B. Color

As NameSayer aims to help Deans, representing a user group of >50 year olds, the color palette must remain subtle, neutral, consistent, and, most importantly, it must be effective. With that in mind, our final version used dark blue as the main color and light yellow for the components we want the user to pay attention to: 'Practice' and 'Add' buttons in the main menu due to their importance for workflow (Fig.3) and 'Rate audio quality', 'Try different versions'(Fig.5) in the practice window as we do not want the User to overlook their functionality.
Additionally, the color was effectively used in the Rating window, where good recordings are represented in green and bad recordings are represented in red.

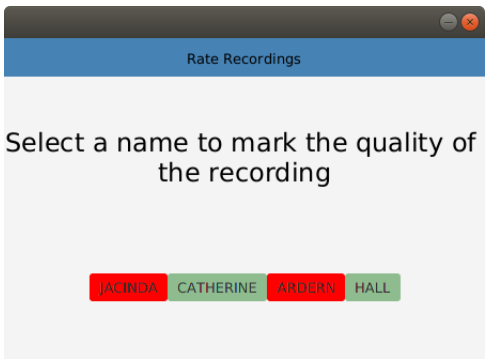

Fig. 2. Rate Recording Window

C. Display Layout and Presentation of Information

One of the cornerstones of good user experience is careful layout of app's functionality, every window must have not too many and not too little elements to remain useful.
During team design meetings, we came to the decision which defined the look of the app - NameSayer interface logically separates the functionality and presented information into two main categories: playlist/database manipulation and practice mode.

1) Main Window: The starting point of the application is the database/playlist window(Fig.3).

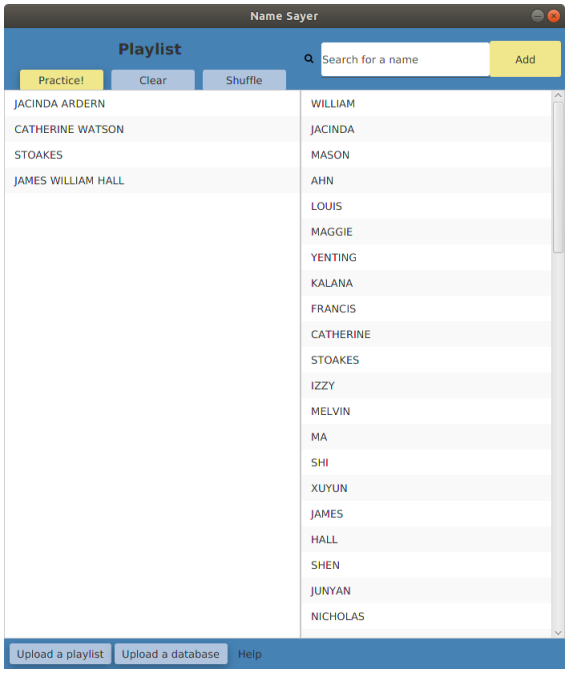

Fig. 3. NameSayer's Main Window

Here you can observe a reasonably minimal interface which provides you just enough tools to create your playlist for practice or manipulate the database. The whole database is visible to the User and the name adding is intuitively performed through the search box. This look, with minor tweaks and grown functionality, was maintained through every stage of NameSayer's development, starting from Assignment 2, as it represents all the necessary initial information in a clear and concise way.
From this window the User can be taken into the practice mode, where the rest of the functionality is conveyed.

2) Practice Mode: This pane provides the User the tool set of listening, recording, rating and comparing names recordings, as well as navigating through the playlist.

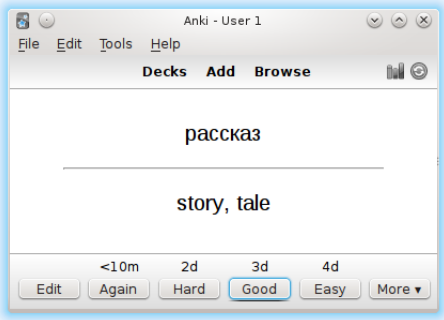

Fig. 4. ANKI Practice Window

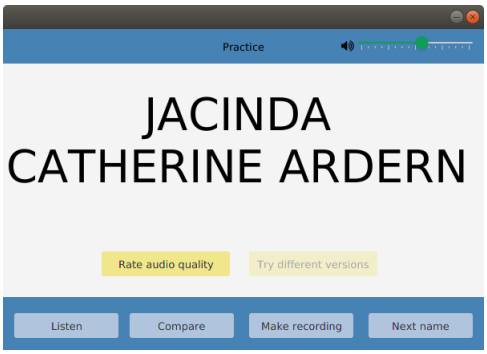

Fig. 5. NameSayer's Practice Window inspired by ANKI

While trying to provide the required functionality, we implemented a simple flashcard look to assist the User in his main goal: learning. This look was inspired by ANKI, a spaced repetition flashcard program.
We strived to keep the amount of interactive elements to a minimum to avoid confusing the user. While all functions which have anything to do with practice can be accessed through the Practice window, some buttons, such as 'Rate audio Quality', 'Make recording' and 'Try different versions' open new windows which elaborate on these functions (See Fig.2 for an example). For full view and description of these windows please refer to the User Manual.

D. Other Interface Issues

Some functions of NameSayer require the program to present visual feedback to the user to ensure good user experience. During the development, we extensively discussed

which features should be visual for the user. It was found that 'Make Recording', 'Test Mic' and volume control must provide visual feedback of their work. We achieved the goal of better visualisation through the use of progress bars and sliders for the appropriate functions (Fig.6-7)

Fig. 6. Volume Control

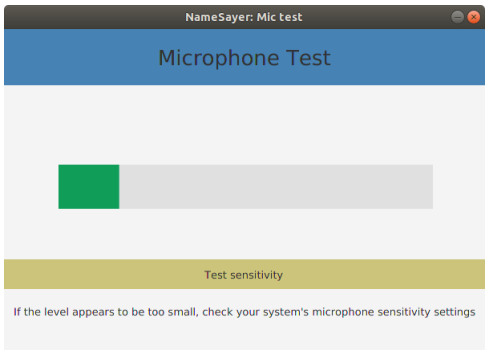

Fig. 7. Microphone Sensitivity Level

III. NameSayer - Functionality and Feature Overview

A. Overview

The NameSayer application meets the requirements laid out in the project brief provided by Dr Catherine Watson. The main functionalities include the Names database access, playback of composite names, a recording module, help feature, practice module, handling multiple variation of the same name, bad recording rating system and reward system.
For in-depth explanation of how these functions were implemented in NameSayer please refer to the User Manual where each on of them are fully elaborated on.
NameSayer also implements features outside the requirements list such as upload of the User's database, SmartSearch, shortcuts, volume control, useful hints and direct access to other versions of a name.

B. Upload User's database

To allow user to practice the names outside of a database provided with the NameSayer app, we implemented Upload Database feature. If User wishes to import his own database, he may locate it in his system through the System Explorer. If the database is given in the right format, described in the User's manual, it will replace the old one in the main window. This feature gives more freedom to the User by not limiting him to the content provided with the app.

C. Smart Search

The searchbox in the Main Menu of the app filters down the database in real time. While it may seem as a simple feature, its presence have completely changed the interaction with the database, making user experience more enjoyable and fluid. With every letter typed in, Smart Search narrows down the database results to match the entered sequence, resetting the results if a next name is being typed.

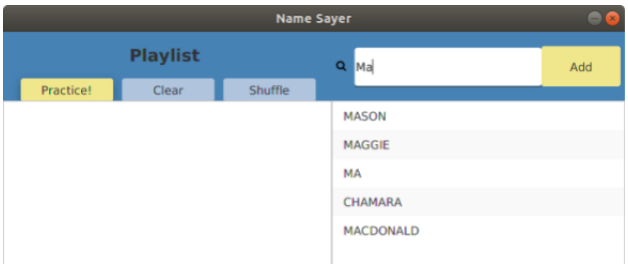

Fig. 8. Smart Search filtering

D. Shortcuts

To make the process of adding names to the playlist seamless and intuitive, we added shortcuts for adding names to the playlist, such as double clicking the database entry to add it to the name in the search box and pressing Enter to pass the name from the searchbox to the playlist.

E. Volume Control

For better user experience, the User needs to be allowed to control the volume of playback within the app, to make it louder/quieter depending on the external environment. This was achieved with implementation of volume control for the practice window. For this special feature we have decided not to allow the user to mute the playback via the app, as it practically makes almost every feature of the app useless. Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

F. Units

- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive".
- Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
- Do not mix complete spellings and abbreviations of units: "Wb/m^2" or "webers per square meter", not "webers/m^2".

Spell out units when they appear in text: ". . . a few henries", not ". . . a few H".
- Use a zero before decimal points: "0.25", not ".25". Use "cm^3", not "cc".)

G. Equations

Number equations consecutively. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \tag{1}$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(1)", not "Eq. (1)" or "equation (1)", except at the beginning of a sentence: "Equation (1) is . . ."

H. LaTeX-Specific Advice

Please use "soft" (e.g., `\eqref{Eq}`) cross references instead of "hard" references (e.g., `(1)`). That will make it possible to combine sections, add equations, or change the order of figures or citations without having to go through the file line by line.

Please don't use the `{eqnarray}` equation environment. Use `{align}` or `{IEEEeqnarray}` instead. The `{eqnarray}` environment leaves unsightly spaces around relation symbols.

Please note that the `{subequations}` environment in LaTeX will increment the main equation counter even when there are no equation numbers displayed. If you forget that, you might write an article in which the equation numbers skip from (17) to (20), causing the copy editors to wonder if you've discovered a new method of counting.

BibTeX does not work by magic. It doesn't get the bibliographic data from thin air but from .bib files. If you use BibTeX to produce a bibliography you must send the .bib files.

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Do not use `\nonumber` inside the `{array}` environment. It will not stop equation numbers inside `{array}` (there won't be any anyway) and it might stop a wanted equation number in the surrounding equation.

I. Some Common Mistakes

- The word "data" is plural, not singular.
- The subscript for the permeability of vacuum μ_0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter "o".
- In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
- A graph within a graph is an "inset", not an "insert". The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates).
- Do not use the word "essentially" to mean "approximately" or "effectively".
- In your paper title, if the words "that uses" can accurately replace the word "using", capitalize the "u"; if not, keep using lower-cased.
- Be aware of the different meanings of the homophones "affect" and "effect", "complement" and "compliment", "discreet" and "discrete", "principal" and "principle".
- Do not confuse "imply" and "infer".
- The prefix "non" is not a word; it should be joined to the word it modifies, usually without a hyphen.
- There is no period after the "et" in the Latin abbreviation "et al.".
- The abbreviation "i.e." means "that is", and the abbreviation "e.g." means "for example".

An excellent style manual for science writers is [7].

J. Authors and Affiliations

The class file is designed for, but not limited to, six authors. A minimum of one author is required for all conference articles. Author names should be listed starting from left to right and then moving down to the next line. This is the author sequence that will be used in future citations and by indexing services. Names should not be listed in columns nor group by affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization).

K. Identify the Headings

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is "Heading 5". Use "figure caption" for your Figure captions, and "table head" for your table title. Run-in heads, such as "Abstract", will require you to apply a style (in this case, italic) in addition to the style

provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced.

L. Figures and Tables

a) Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation "Fig. 9", even at the beginning of a sentence.

TABLE I
TABLE TYPE STYLES

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[a]Sample of a Table footnote.

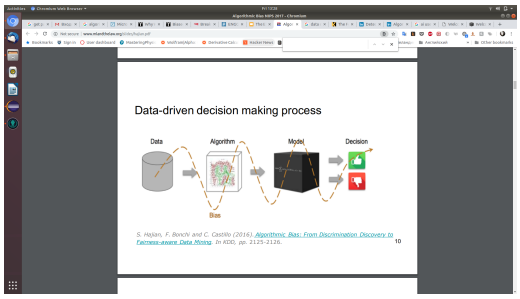

Fig. 9. Example of a figure caption.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization {A[m(1)]}", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression "one of us (R. B. G.) thanks ...". Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

Please number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first ..."

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

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