The Harmonizome Mobile Application

Available on the App Store

ANDROID APP ON Google play

iOS: http://appstore.com/harmonizome

Android: http://goo.gl/JWII8H

BD2K - LINCS DATA COORDINATION AND INTEGRATION CENTER

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Abstract

Most online databases that enlist properties of human genes and proteins only include information from a hand full of resources. Genomics, transcriptomics and proteomics resources can provide additional information about single genes or proteins, but these are not readily organized and abstracted for such purpose. To create the Harmonizome mobile app, we assembled, extracted, and organized knowledge from over 60 online resources, including novel databases that we created such as: ChEA, KEA, SILAC phosphoproteomics, ESCAPE, PPI Hubs, and collections of signatures extracted from GEO.

The Harmonizome mobile app serves this accumulated knowledge in an easy to access interface where users can enter their gene/protein of interest to discover its properties and functions. The knowledge spans many bioinformatics omics resources from expression in cells, tissues and diseases; regulation by transcription factors, chromatin marks and microRNAs; functional membership in protein complexes, pathways and ontologies; genomic associations with disease, and differential expression upon treatment of human cells with drugs; as well as structural and other genomic features. The Harmonizome app serves the collected knowledge in defined categories for navigation ease, and with links out for further exploration of associated functions of genes and proteins. The Harmonizome mobile application is available at the Google Play Store: http://goo.gl/JWII8H for Android devices, and the App Store http://appstore.com/harmonizome for iOS devices.

Methods

The Harmonizome mobile application consists of an iPhone and Android application in addition to a web server for retrieving entity information and relationships. Although the application exists on two platforms, there is only one code base built on top of Facebook's React Native (Facebook, 2015); a framework for building cross-platform native applications using Javascript. The application's server, written in Java, communicates with a MySQL database containing the searchable entities as well their relationships with terms from over 60 online databases.

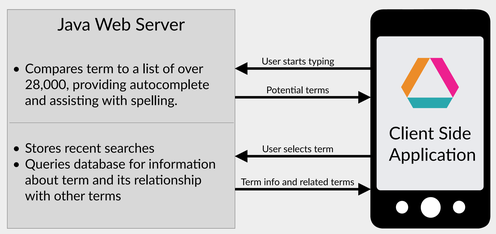

Figure 1. The Harmonizome mobile application's architecture: A client-side mobile application and Java web server.

Results

In order to use the Harmonizome mobile application, a device running Android (4.1+) or iOS (8.2+) with an internet connection is required. The application is downloaded from the Google Play Store for Android devices or the App Store for iOS devices. Once the application is started, the screen will look similar to figure 2. By typing a query into the search bar, you'll notice that the appearance will change to that of figure 3. The terms available in the autocomplete options below the search bar are pulled from the Harmonizome's web server. While you are required to select one of these provided terms, there are over 28,000 available and new ones are being added. Finally, selecting a term brings you to the category screen, where results are sorted by various categories depending on the term selected. This view is shown in figure 4.

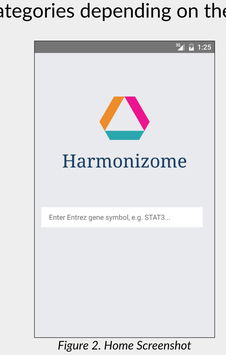

Figure 2. Home Screenshot

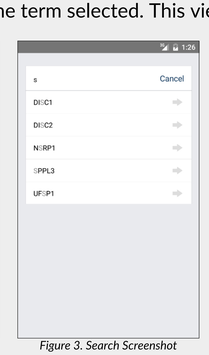

Figure 3. Search Screenshot

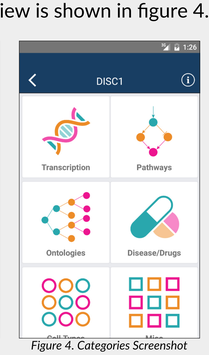

Figure 4. Categories Screenshot

Upon pressing on a category, a list of available libraries is shown (figure 5). These libraries lead to a results page showing all related terms (figure 6). The class of these terms depend on the category and library selected. If available, links out are provided to read additional information on the term. Finally, at any time, pressing the info (i) button at the top right corner reveals additional information about the term itself, such as its full name and synonyms (figure 7).

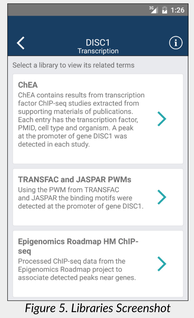

Figure 5. Libraries Screenshot

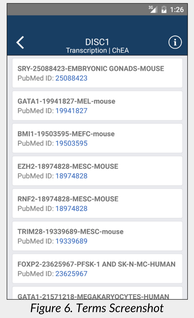

Figure 6. Terms Screenshot

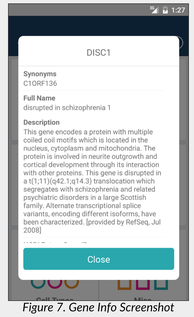

Figure 7. Gene Info Screenshot

Conclusions

Despite the increasing popularity of the iOS and Android mobile platforms, there are a limited number of native applications suited to researchers. With approximately 70 downloads across both platforms, the Harmonizome mobile application is already being used by researchers to quickly access knowledge about genes, proteins, and functional terms from anywhere.

The Harmonizome mobile application is available at the Google Play Store: http://goo.gl/JWII8H for Android devices, and the App Store http://appstore.com/harmonizome for iOS devices.

References

- Chen, E.Y., et al. (2013) Enrichr: interactive and collaborative HTML5 gene list enrichment analysis tool, BMC bioinformatics, 14, 128.
- Harmonizome - http://amp.pharm.mssm.edu
- React Native: A Framework for Building Native Apps with React - Facebook © 2015 - https://facebook.github.io/react-native/

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