**Documentation of GUI Tool for cost sensitive feature selection.**

This software application for using cost sensitive feature selection to select dementia diagnosis test items based on assessment time is made available at https://mac-n.shinyapps.io/costcfs. A video demonstrating the use of the app is available in the GitHub repository: https://github.com/mac-n/Rshiny-app. As illustrated, the GUI design is minimalist and does not require computational expertise. The app has been tested on OS X (Mohave version) and Windows 10, on the Safari, Chrome, Firefox and Edge browsers.

Upon opening the application, a selection box (Fig. 1a) allows users to choose any subset of the assessment items in the dataset for analysis. For instance, some clinicians may only use specific assessment items (e.g. specific assessment questions within MMSE and MoCA) due to the nature of their practice. To further assist this, a drop-down menu was included(Fig. 1b) listing subsets expected to be of interest to users, (i) assessment items previously selected by features selection as most informative ; (ii) complete set of assessment items in MMSE; (iii) complete set of assessment items in MocA; (iv) complete set of assessment items in ADAS; and (v) complete set of assessment items in FAQ. For further details on the data and algorithms used here, see the paper at

Upon choosing the subsets of assessments for analysis, the items will be displayed in a table (Fig. 1c). The user may then edit the costs (time, in seconds) associated with these features. Note that no time cost was estimated for features other than those shown in Fig. 1, other features have been assigned a default value of 1001 seconds, which a user can easily edit.

Cost-sensitive CFS feature selection is toggled on and off with a checkbox (Fig. 1d) and the cost parameter is varied with a slider (Fig. 1d.) If the user wishes to perform feature selection without considering feature costs, the parameter may be set to zero. The algorithm is activated with the "Run Tests" button. (Fig. 1d). If feature selection is toggled on, an RF classifier will be built and tested using the subset of user-chosen assessment items selected by the algorithm. Otherwise, the classifier will be built using all the user-chosen assessment items.

Upon completing the calculation, the classifier for the 3-class classification AUC, the overall assessment time for the assessment items used in the classifier, the names of all the assessment items used and their feature importance value in the model will be displayed (Fig. 1e).

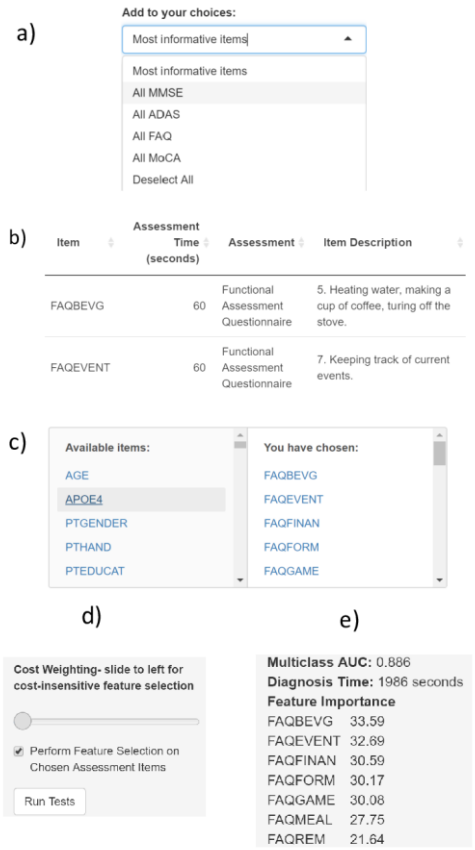


**Fig. 1 Different features of the cost-benefit analytical sandbox tool.**. *(a)-(e): Order of features appearing during usage.*