

SYSTEM AND METHOD FOR GENERATING DATABASE INPUT FORMS

The present invention relates generally to generating database data input forms, and particularly to a system and method for generating computerized database data input forms from printed data forms and for customizing database data input forms for efficient use by end users.

BACKGROUND OF THE INVENTION

Many database programs include user interface software and programming tools for defining data entry forms, and for linking fields in those data entry forms to fields in database tables. While the prior art contains a variety of such user interface programming tools, there is a need for improved user interface software that is specifically designed to facilitate the conversion of an existing non-computerized (i.e., paper) data entry form into a computer based data entry form.

Many institutions continue to use paper based data entry forms, with data from completed paper forms being entered into computers by different personnel than those who fill in the paper forms. With the growing availability of limited and unlimited vocabulary voice recognition systems, the inventors of the present invention believe the division of duties between data gathering and computerized data entry can be eliminated in many more situations than would previously have been possible.

SUMMARY OF THE INVENTION

In summary, the present invention is a system for generating computer data entry forms in which a scanner is used to scan an existing data entry form and to generate a digitized representation of the data entry form. The system's user interface includes a display for displaying images, a microphone for receiving voiced data and commands, and a mouse, keyboard, pen and/or touchscreen for non-voice based data entry.

Numerous voice files are stored in the system's computer memory, each voice file representing voice recognition information associated with a predefined word or phrase. Also stored in the system's computer memory is a database for storing information, such as records associated with operation of a business.

The present invention provides a set of form definition procedures, responsive to user commands, including an imaging procedure for displaying at least a portion of the scanned data entry form on the display and a region definition procedure for enabling a user to indicate regions of the displayed data entry form.

Object definition procedures are provided for enabling a user to define a multiplicity of objects, including form sections and subsections, text boxes, checkbox buttons and popup menus, and for specifying properties of the defined objects. The object properties that can be specified include (A) database links for linking selected objects to respective specified fields in the database, (B) exclusionary relationships for specifying which objects cannot be selected by end users when others of the objects have previously been selected, and (C) voice file links indicating which ones of the voice files to use for end user voiced selection of the objects. The object definition procedures store, in a form definition data structure in the computer system's memory, form definition data corresponding to the user defined objects and user specified object properties.

A computerized form data entry procedure coupled to the microphone and the form definition data structure responds to end user voiced commands and end user selection of the previously defined objects in the form by displaying on the display a representation of the data entry form with visual indications of objects selected by the end user and by storing corresponding data in the database.

The scanned form can be color coded to indicate different objects in the form and color information in the form's digitized representation is automatically decoded to generate object and object property definitions. The use of color coding, by highlighting different sections of the printed data entry form with different colors to indicate the functions of each colored section reduces the amount of work associated with defining a computer based data entry form.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional objects and features of the invention will be more readily apparent from the following detailed description and appended claims when taken in conjunction with the drawings, in which:

FIG. 1 is a block diagram of a computer system for converting paper based data entry forms into computer based data entry forms and for then using the computer based data entry forms to collect and store data, where data entry using a variety of input devices, including voice input devices, is supported.

FIG. 2 depicts an example of a paper based data entry form.

FIG. 3 (including FIGS. 3A and 3B) is a flow chart of the process for generating a computer based data entry form from a paper based data entry form.

FIGS. 4, 5 and 6 show the visual display generated by the form conversion process of FIG. 3 while defining various form objects.

FIGS. 7 and 8 depict dialog boxes used during the form conversion process to specify properties of the form objects.

FIG. 9 depicts a paper based data entry form that has been color coded to specify many of the form objects and some of the object properties for a corresponding computerized data entry form.

FIG. 10 (including FIGS. 10A and 10B) is a flow chart of the process for interpreting the color codings on a scanned paper based data entry sheet and for automatically defining, without human assistance, form objects and specifying form object properties based on the color codings.

FIG. 11 is a block diagram of a portion of a computer system for utilizing the computer based data entry form of the present invention for voice input based data collection.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a computer system 100 incorporating the present invention includes a central processing unit 102, primary and secondary computer memory subsystems 104, a user interface 106 and a document scanner 108. The user interface 106 typically includes a display 110, a microphone 112, an audio speaker 114, and a pointing device 116 such as a mouse or trackball. In the preferred embodiment, the user interface 106 also includes a keyboard 118 for entering text and a printer 119. The scanner 108 is used to scan in paper based data entry forms 120, which is the first step of the process for generating a computer based data entry form in the present invention.