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DEVELOPMENT OF FIBER ASSEMBLY PROPERTY DATABASE

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Abstract

An user-friendly fiber assembly database has been created to understand and analyze the quality trends of cotton fiber properties and the properties of yarns produced from them. The methodology behind the database development has been systematically explained in this paper.

Introduction

Knowledge-based systems for identifying yarn properties from fiber properties would be highly beneficial for the spinning industry. It is extremely useful to devise a system to identify the resulting yarn properties from the properties of a variety of fibers varying in their physical and chemical nature, properties, etc. The first step to develop a yarn property knowledge-based system is the creation of a fiber assembly property (FAP) database. The data collected over a period in the database would provide a future guidance to fiber producers in identifying important fiber characteristics that contribute towards the overall quality of the yarn and fabrics. In the case of natural fibers like cotton, this data might help researchers to pursue studies on the reasons for the quality differences among the same variety grown in different areas or different variety of crops grown in the same or different areas. The fiber quality trends and the knowledge obtained from such a database will help with the improvement of the crop variety, crop yield and quality of yarns spun from them.

This paper reports the methodology behind the development of an MS Access based database system, which has a user-friendly interface to input and retrieve the physical properties of a variety of cottons. To the authors' best knowledge, such a database system has heretofore not been reported in the literature. Specific features of the software and the results obtained from the database are delineated in the following sections of this paper.

Methodology

A database is used to store and retrieve vast amount of data. Databases are used in different segments of industries to handle bulk data that results from a myriad of day-to-day transactions. Managing this data is taken care by data management softwares that are currently available in the market. Effective and efficient storage and retrieval of data items and records are the primary tasks of data management. Database Management System (DBMS) is a software that allows the creation, the manipulation and the maintenance of data. DBMS provides general purpose routines and protocols for managing large quantities of data and isolate applications from physical data storage details. It also facilitates data sharing by multiple users and applications and can secure data against unauthorized access thereby providing data security.

Microsoft Access (MS Access) is a relational DBMS. It allows creating database structures containing fields, tables, and table relationships and also permits addition, modification and deletion of records. Furthermore, MS Access contains built-in report generator that aids in developing professional reports from the entered data. It also offers an easy-to-use database for managing and sharing data among users. As briefed in the introduction, an MS Access based database has been developed to store the physical properties of cotton fibers. The importance of this software is that it provides a useful platform to store huge data on the properties of a variety of cotton fibers, yarn, etc. The database can also be extended to cover the properties of fabrics made from the fibers and yarns whose values are available in the database. Such a database will be very resourceful to understand the correlation between fiber, yarn and fabric properties. The raw data for the database were obtained from the annual progress reports for the Texas Food and Fibers Commission. The advantages of incorporating the cotton fiber test results of the public domain into an MS Access database are the creation of forms for interacting with the test results and the creation of reports for the purpose of analyzing and printing the results as and when required. MS Access was selected because of its user-friendly features, MS SQL Server Interoperability (back-end enterprise database) features, etc.

The FAP database developed contains five tables to capture Advanced Fiber Information System (AFIS) test results, High Volume Instrument (HVI) test results, PEYER results, Skein strength test results, Single yarn and Uster evenness test results. MS Access Forms were created that can be navigated easily by the end user to get the fiber and yarn data stored in the database. The first form named Textile1 shown in Figure 1 has the following labels displaying the records from four tables namely MAIN, AFIS, HVIDATA and PEYERRESULTS. Users can then easily navigate the records one by one with the help of a navigation bar provided at the bottom left most corner of the form. For adding a new record, the user has to click on the new record item in the menu bar of the form so that the inserted new record is added to the database tables automatically.

The second form called Textile2 shown in Figure 2 contains all the yarn properties that can be classified into two categories namely rotor and ring yarns respectively. The data for Textile2 form is drawn from MAIN and YARNPROPERTIES Table. Textile2 form contains the results from Skein test, single yarn strength test and Uster evenness tests. As shown in Figure 3, Textile2 form also contains navigation bars at the bottom left hand corner for the user to browse through the records. Figure 4 gives the flowchart of user-software interactions when the user tries to enter a new fiber variety into the FAP database.

Conclusions

Fiber and yarn properties that were obtained from standard tests were used to develop a user-friendly FAP database. Such a database is a valuable tool for crop development, fiber and yarn quality management. In addition, this database will help during production and management decision making processes both in agriculture and manufacturing. The data collected over a vast period of time in the database would provide guidance to the fiber producers in terms of the quality of the crop over a period of time.

Acknowledgements

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References

Annual Progress Reports for the Texas Food and Fibers Commission, ITC, Texas Tech University, TX, USA.

Barker, Scott.F. , Access 95 Power Programming, Indianapolis, 1996, IN.

Blaha, Michael. R., A Managers' Guide to Database Technology: Building and Purchasing Better Applications, Prentice-Hall Inc, 2001, NJ.

Cardenas, Alfonso.F. , Data base Management Systems, Allyn and Bacon Inc, 1985, Boston.

Dastoor, P.H., Radhakrishnaiah, P., Srinivasan, K., Jayaraman, S., SDAS: A Knowledge-Based Framework for Analyzing Defects in Apparel Manufacturing, J. Textile Inst., 85 (4), 542-560 (1994).

Jayaraman, S., Bridging Yesterday With Tomorrow, ATI, January, 36-37 (1997).

Joseph, J. A., Kathleen, T. F., New Perspectives on Microsoft Access 2000, Course Technology, 1999, USA.

Lam, Jimmy K.C., Development of Woven Fabric Sample Database By HTML, The Textile Institute's 1997 World Conference in association with the 5th Textile Symposium of the Exporters and Knitting Industries Association of Northern Greece, Textiles and the Information Society, Volume ?, 345-348 (1997).

Microsoft Access Tutorial, http://mis.bus.sfu.ca/tutorials/MSAccess/tutorials.html

Microsoft Access® 2000 Software.

Vasconcelos, R.M, A Knowledge-Based System for Spinning Management, Textile Res.J. 66(4), 265-268 (1996).

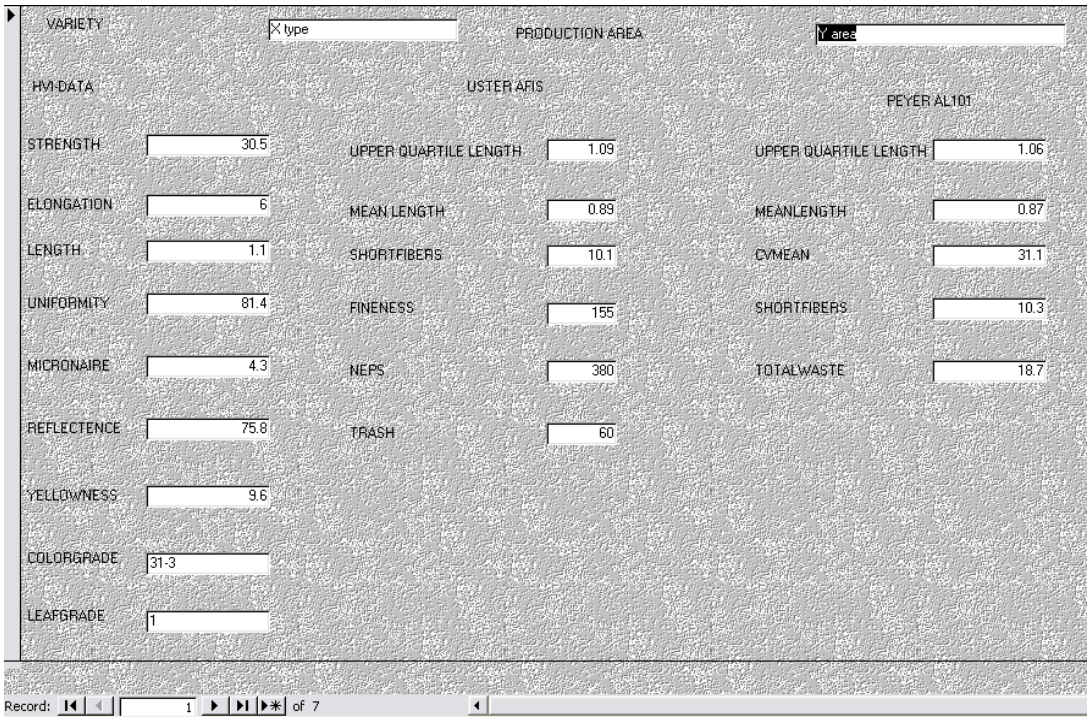

Figure 1. Screen Shot of Textile1 Form.

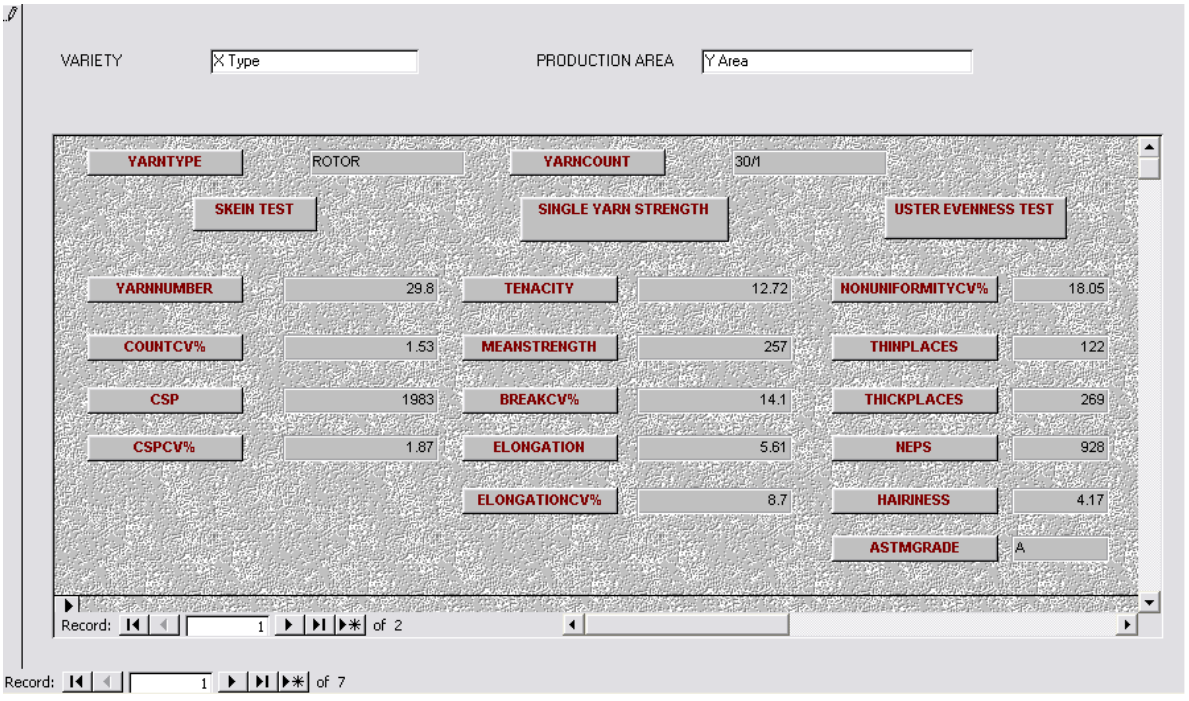

Figure 2. Screen Shot of Textile2 Form.

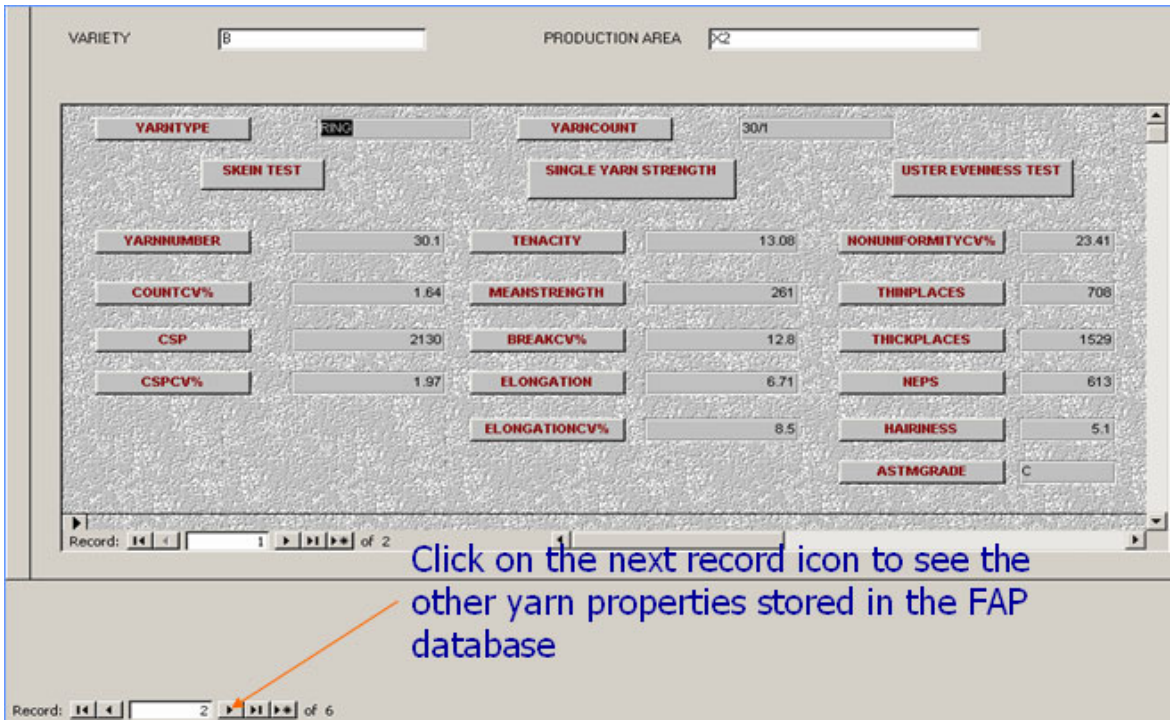

Figure 3. Screen Shot of Textile2 Form Showing How to Navigate Properties of Yarn Type.

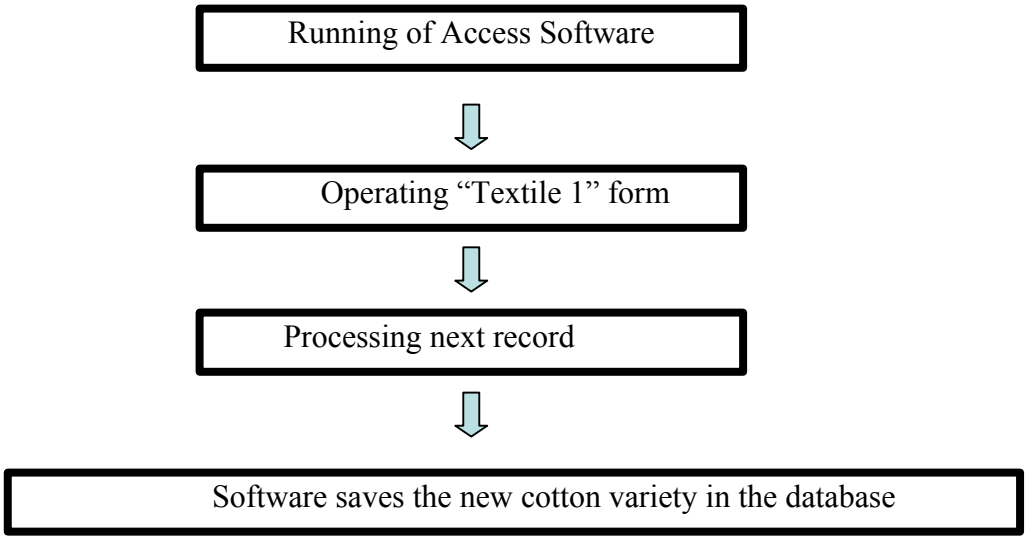

Figure 4. Flow Chart of the User-Software Interaction.