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CYBERSNOOPING: I SEE WHAT YOU DID THERE

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ABSTRACT

Facebook, the world's largest electronic social network (ESN), reached its 10th birthday in February 2014. Beginning with a few hundred users at a single U.S. university, Facebook now boasts over a billion members worldwide (Stone & Frier, 2014). Facebook's growth is emblematic of the growth of ESN's in general. Billions of people and organizations use Twitter, Instagram, Linked In, Pinterest, and other ESN's to connect, communicate and share information. Much of the data stored and communicated through ESN's is personal in nature, but also of great interest to organizations. Facebook sells data to companies largely for marketing purposes, and many businesses use Facebook and Twitter to market to individuals based on the personal data they have provided (Stone, 2010).

Another area that is attracting increased interest is the use of ESN data by HR departments for screening and hiring purposes. Employee turnover is costly and employers are looking for ways to minimize their losses through better selection and hiring practices. Employers and recruiters are looking for more economical and efficient ways of recruiting and hiring prospective job candidates. Recent studies reveal an increasing trend in the use of electronic networking sites by prospective employers and recruiters as a tool to screen applicants (Lorenz, 2009). The traditional tools, applications, interviews and references may provide a one dimensional view of the candidate who may have been thoroughly coached about how to create a winning resume, dress for success and interview in order to obtain an offer. Thus, hiring managers are using ESN's to evaluate candidates' character and personality outside the confines of the traditional interview process. According to a 2009 survey conducted by Careerbuilders, the main reasons that hiring managers use ESN's to conduct background research were: to see if the candidate presents themselves professionally, to see if the candidate is a good fit for the company culture, to learn more about the candidate's qualifications, to see if the candidate is well-rounded, and to look for reasons not to hire the candidate (Lorenz, 2009). Some employers have indicated that the reasons why they would not hire a candidate includes posting provocative or inappropriate photographs, information about drinking or using drugs, poor communication skills, badmouthing a previous company or fellow employees, using discriminatory remarks related to race, gender, religion, or lying about the qualifications (Wiley et al, 2012). In summary, ESN's may give employers a fuller sense of the types of decisions a job applicant will make once hired (Brandenberg, 2008).

Concerns about the use of ESM data are raised because they contain pictures, comments and other personal information that would not be gleaned from a face-to-face interview. Furthermore, stringent guidelines imposed by the Equal Employment Opportunity Commission severely limit the information an interviewer may solicit. During interviews, employers may not ask questions regarding race, religion, sexual preference or marital status; yet all of this information can easily be uncovered by looking at a candidate's ESN profile. The use of acquired information in a way that would eliminate an applicant may give rise to a claim of discrimination in violation of federal laws. Applicants voluntarily divulge personal information without an appreciable understanding of how that information can be accessed, viewed and used by a prospective employer. Thus, ESN's may allow employers to be "undetectable voyeurs to personal information and make employment decisions based on that information (Clark & Roberts, 2010).

Individuals who are concerned about what their online data might reveal should therefore take care to secure it properly. However, this is easier said than done. Each ESN has different types of data and different mechanisms for securing it, and these change over time. Terms of Use and Privacy Settings also change over time, so data that is considered private today may no longer be considered private a month from now. This presents an issue for individuals applying for new positions, and a challenging legal environment for organizations that want to use ESN data in the hiring process. Recent reports of employers asking applicants or employees for their ESN passwords has led to a flurry of state and federal legislative activity prohibiting employers from asking for this information. As of 2014, legislation has been introduced or is pending in 26 states that would prohibit an employer from asking job applicants and employees for their passwords. There are appreciable ethical and legal risks associated with using ESN's as a prescreening tool including invasion of privacy concerns, authenticity issues about the data and materials and legal issues concerning how the ENS was accessed and how the information is used in the decision making process (Jones & Behling, 2010).

In this paper we will examine the different types of data that are available on ESN's, and the privacy controls that are available to limit access to that data. We will discuss issues that can limit those controls from being effective, and propose a framework for examining and mitigating these issues. We will also present the results of a survey describing students' attitudes and behaviors toward securing their data online. The survey results are particularly relevant to our context since students are heavy ESN users, are often preparing to enter the workforce, and may find themselves subject to employer screening based on their available ESN data.

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REVISITING SOFTWARE PIRACY USING GLOBE CULTURAL PRACTICES

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ABSTRACT

Software piracy emerged with personal computers and is associated with the illegal reproduction, unauthorized use, or downloading of software. Statistics from the Business Software alliance (BSA) note that the software piracy rate is approximately 42% worldwide and represents potential losses in sales revenue of up to US$ 60 billion. Earlier studies addressed software piracy utilizing economic wealth and culture factors to understand the phenomena. In terms of culture, previous research have used Hofstede's operationalization of cultural values. This study differentiates by using the GLOBE's project operationalization of cultural practices to revisit the software piracy issue. Our findings confirm that, in terms of culture, the dimension of collectivism is an important factor explaining software piracy rate. Additionally, this study finds that GLOBE's dimension of performance orientation is associated with a reduction of piracy rate. Further, we confirm that GDP per capita has a negative relationship with software piracy. This study contributes to the literature by confirming previous findings about collectivism and software piracy using a different culture instrument that can measure practices instead of values. In addition, it finds that performance orientation practices, as operationalized by GLOBE, have a relationship with software piracy rate.

GREEN COMPUTING

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ABSTRACT

Ever since Alan Turing's notion of "computers" and "algorithms" in the 1930's, computing technology has become a larger part of human existence due to its many conveniences and benefits. There is no doubt that computers will stay and evolve with humanity for the foreseeable future. Yet, there is a dark side to technology that is not mentioned often enough…the fact that it requires a lot of energy and materials to design, manufacture, transport, retail, and operate A lot of that energy is produced by burning fossil fuels, which then result in the degradation of our environment. Similarly many of the materials utilized in the manufacturing of technology are also not only toxic, but also non-biodegradable, thus resulting in a rapidly growing massive pile of toxic electronic-waste.

Green computing refers to environmentally sound IT, and is the study and practice of designing, manufacturing, using, and disposing of computers, efficiently and effectively with minimal or no impact on the environment [Murugesan, 1998]. It would be even better if technology actually decreases the environmental impact of all human activities. In the past, humans have invented technological devices and worried whether they would work. Presently we have the additional burden of inventing technology that is designed, manufactured, sold, used, and eventually disposed of in an environmentally responsible manner as well. The real kicker is that such a notion also adds to the bottom line of organizations as efficiency leads to lower costs and less waste. In the future, computers and technology will not only assist humans in their everyday lives, but also encompass a secondary mission of conserving and protecting our precious, but limited natural resources.

The purpose of this article is to examine the various ways in which computing technology is evolving to become more "green" or environmentally responsible. Specifically, we illustrate how techniques such as server virtualization, cloud computing, and better data center design go a long way to promote green computing. The use of energy efficient devices such as tablet computers and smartphones, instead of desktop computers, also enhance energy and material efficiencies. Finally, the paper also examines the role of various environmental standards such as ENERGY STAR and EPEAT in making computing more sustainable.

This paper will be beneficial to academic researchers as it will provide a solid basis for conducting relevant research in the green computing area. Business managers in organizations will also greatly benefit from the paper, as it would make them aware of the latest trends in

green computing, which in turn will reduce their operating costs (thus adding to the bottom line), and make their organizations more environmentally responsible.

IMPACT OF EDUCATION AND AWARENESS PROGRAMS ON THE USAGE AND ATTITUDE TOWARDS TEXTING WHILE DRIVING AMONG YOUNG DRIVERS

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ABSTRACT

Texting-while-driving has become a new menace on the roads. The problem has become a major cause of highways accidents and injuries especially among young drivers. It well documented in research literature that this problem is more prevalent among younger drivers largely because they are the heaviest users of the information technology including texting. Furthermore, the usage of texting is growing rapidly among millennium generation drivers. As this population grows old, texting might become even more prevalent on the roads. This has potential of further increasing accident hazards due to texting-while-driving in the future.

In a very short span of time, texting-while-driving problem became such a large issue that 32 US states and territories have made some laws against it. However, law is only one part of the equation. Driver education is the equally important to solve the issues. It is very important to educate driving public about danger of texting-while-driving. One can draw parallel with seat-belt laws. Each state has seatbelt law on their books for a longtime. At the same time, both state and federal governments made strong efforts in the area of public education about advantages of using seatbelts. Despite aggressive enforcement and creative awareness programs, it took decades to improve seatbelt usage among drivers. Therefore, it is imperative to start strongly education programs about danger of texting-while-driving now.

The available literature suggests younger driver have different perceptions of risk that impacts their behavior related to cell phone use while driving. As mentioned, there are laws being written to combat the problem. It has also been reported that the decrease in cell phone use after enactment of law does not hold over the time and that use of cellular phones actually increases following the initial decrease. Moreover, the enforcement of the laws related to texting-while-driving is very difficult and challenging. This challenge is evident from reported increases in the use of cell phone and related electronic device activities while driving. Furthermore, law based solutions alone can't change driving behavior. These solutions have to be complimented with education and awareness programs. Several studies have been completed

about reasons on why young drivers are attracted to texting-while-driving. However, there is a lack of studies in the area of impact of education and awareness programs about danger of texting-while-driving. This research focused on the effectiveness of a few education and awareness programs on a small targeted population of college students. A three step methodology was utilized in this research. In the first step, student behavior attributes related to texting-while-driving was be determined. The next step involved selection and design of specific awareness programs based on the data from the first step. The last step involved conducting a random pretest-posttest experiment on a sample from the target population. The results of these experiments were measured to assess the effectiveness of the selected educational programs about danger of texting-while-driving.

DEVELOPMENT OF BUSINESS INTELLIGENCE TOOL BASED ON NEURAL NETWORK AND GENETIC ALGORITHM FOR INDIAN STOCK MARKET PREDICTION

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ABSTRACT

In this paper, we develop a Business Intelligence (BI) tool based on Neuro-Genetic technique using JAVA programming language. This tool provides an interactive graphical interface to assist the user in obtaining results with training and testing data. We have tested the model with two different architectures for two data partitions of BSE30 and BSE100 indices.

INTRODUCTION

Business Intelligence (BI) tools are becoming very popular due to its reliable prediction capability. BI uses its collection of techniques and tools to support businesses in various aspect of decision-making (Mikroyannidis & Theodoulidis, 2010). Artificial neural network (ANN) techniques (Haykin, 1994) have been widely accepted and used for stock market forecasting, however, these methods may have their own disadvantages and do not produce precise results. On the other hand, hybrid techniques such as ANN and genetic algorithm (GA) are more reliable for non-linear nature of stock market data.

In literature, many authors have used ANN, GA, or a combination of both for stock market prediction. These studies were mostly designed to optimize the networks weights or to find a good topology (Branke, 1995; Yao, 1999; Kwon & Moon; 2007; Mandziuk & Jaruszewicz, 2011).

In this study, we develop a BI tool that combines ANN with GA. GA is utilized to optimize the weights of ANN and ANN used these weights to forecast stock market. The hybrid GA based ANN (GANN) model was tested in terms of a number of neurons at the hidden layer, and it was found that the GANN architecture with more number of neurons at the hidden layer yields better accuracy.

INDIAN STOCK DATA AND NEURO-GENETIC MODEL

Indian Stock Data: The data of Indian stock market was collected from yahoo finance (http://finance.yahoo.com/). The data consist of daily index price of BSE30 and BSE100 indices from Jan 1, 1999 to Feb 15, 2014. Data are divided into two partitions: 75-25% and 80-20%. Proper and good normalization of data simplifies the process of learning and may improve the accuracy (Kim et al., 2004). For smooth convergence of neural network, we have normalized the data using simple normalization formula as written in equation 1.

$$D(Norm) = \frac{D(i)}{\max(D)} \qquad (1)$$

Where, *D(i)* is the ith instance and max(*D)* is the maximum value of a particular feature.

Neuro–Genetic Model: Back propagation neural network (BPNN) updates its weights by sending back error signals starting from the output layer and popularly known as gradient descent way of learning. BPNN may face problem of local minima as well as network paralysis due to which accuracy of the system may be affected. GA is a global search and optimization method with iterative procedure with constant size of set of chromosome known as population. GA does not guarantee for the optimal solution, to overcome the problem of both and to utilize best features of both, a suitable integration of ANN with GA is required. A genetic algorithm based neural network (GANN) is basically a neural network, in which weight optimization takes place with the help of GA instead of popular gradient descent method used in case of BPNN (Rajasekaran & Pai, 1996) and is widely accepted.

To work with GANN an initial population is required which is generated randomly. Genes of chromosomes are real coded. Length of each chromosome in the population is directly propionate to number of connections in the neural network. A network configuration with l-m-n (l input neurons, m hidden neurons, and *n* output neurons) will require (l + n) m weights. A simple fitness function as written in equation 2 is utilized.

$$F=1/E \qquad (2)$$

Where E is the root mean square of the error of the form given below:

$$E = \sqrt{\frac{(E_1 + E_2 + E_3 + \ldots + E_n)}{n}}$$

Where E_n for i=1,2,...n is error for n[th] instance of the data set and computed as a difference of actual and predicted output.

Once the fitness is computed for each chromosome using equation 2, worst fit chromosomes are replaced with best fit chromosomes and a new population is obtained for

further process of GA using three operators: selection, crossover and mutation. Weights of GANN from the chromosome after each iteration are extracted using equation 3.

$$
W_k = \begin{cases} +\dfrac{X_{kd+2}10^{d-2} + X_{kd+3}10^{d-3} + - - - + X_{(k+1)d}}{10^{d-2}} & \text{if } 5 \le X_{kd+1} \le 9 \\[4mm] -\dfrac{X_{kd+2}10^{d-2} + X_{kd+3}10^{d-3} + - - - + X_{(k+1)d}}{10^{d-2}} & \text{if } 0 \le X_{kd+1} \le 5 \end{cases} \qquad (3)
$$

Where $x_1, x_2, \ldots x_d, \ldots, x_L$ represent a chromosomes and $x_{kd+1}, x_{kd+2} \ldots, x_{(k+1)d}$ represent the kth gene (k>=0) in the chromosome.

BUSINESS INTELLIGENCE TOOL

The Business Intelligence (BI) tool based on theory of GANN discussed above was implemented using JAVA programming language. This framework integrates various web technology tools and intelligent techniques like ANN and GA (Sonar, 2006). The system can be deployed and run under any environment in a standalone machine and can be viewed and discussed according to the layer formed. The system comprises of five layers in all, each of the layer are discussed below.

Physical layer: This layer tells about physical data storage in secondary media in the form of flat file, each file contains the number of instances as first row, and the rest of the rows of files contain instances of the Indian stock data: BSE30 and BSE100. Data are divided into training and testing part as four different files.

Data Access Layer: In order to process data by optimization layer it is necessary to retrieve it from files using Input/output API (Application program Interface).

Optimization Layer: This layer is an important component of the software which consists of two sub components GA and ANN. This is the layer where weights of ANN are optimized by GA and ANN become enough intelligent to forecast index prices. A suitable selection of various tuning parameters of ANN and GA may give better result. In GA single point crossover technique is used while log sigmoidal function is used as an activation function in neurons.

Presentation Layer: This layer is responsible for presenting data in proper and attractive format, to do so various web technology tools like XML (Extensible Markup Language), HTML(Hyper Text Markup Language), XSLT (XML Stylesheet Language Transformation) and CSS (Cascading Style Sheet) are used.

Application Layer: This layer provides interactive GUI based on AWT (Abstract Window toolkit) and Swing API of JAVA. The role of JavaScript in this layer is to validate the data provided to the system. This BI tool performs training and testing with the help of four steps. The first screen as shown in 2(a) asks about name of the project and output directory where system generated html/Xml files containing result will be stored. These files contains

initial and final weights, initial and final population and training/testing result with actual and predicted data along with Mean absolute percentage error (MAPE). The next screen (Figure 2(b)) will ask about the number of hidden layers for ANN with optional bias weight. This BI tool provides facility to create architecture of any type with any number of hidden layers. An ANN architecture with four neurons in input layer and one neuron in outer layer is considered, since there are four input parameters (Low, High, Open and close) and one output parameter (Next-Day-Close) available in the Indian stock dataset on the other hand number of neurons in hidden layer are varying to see the effect of better prediction capability of BI tool. By clicking next button; a new screen as shown in figure 2 (c) will appear which asks about training and testing data set. Finally, a screen as shown in figure 2(d) display all the setting parameters, and soon after, the training process will start and finally results are generated in form of XML file and stored in the desired location.

Figure 1: A typical framework of developed Business Intelligence (BI) Tool
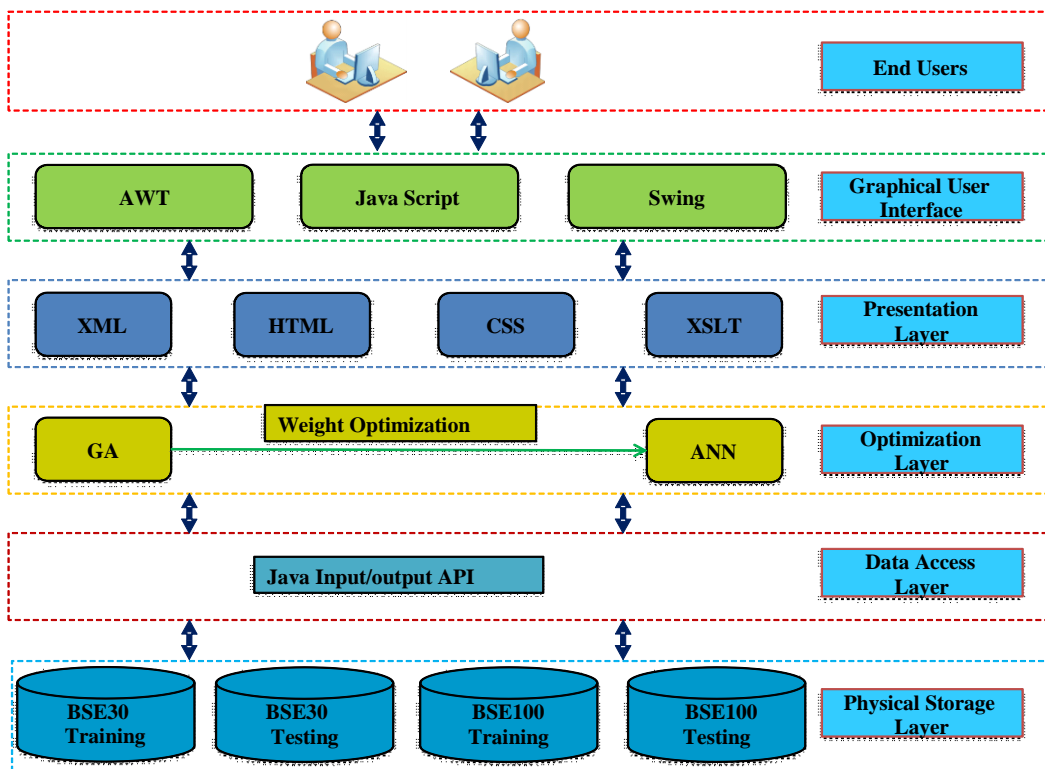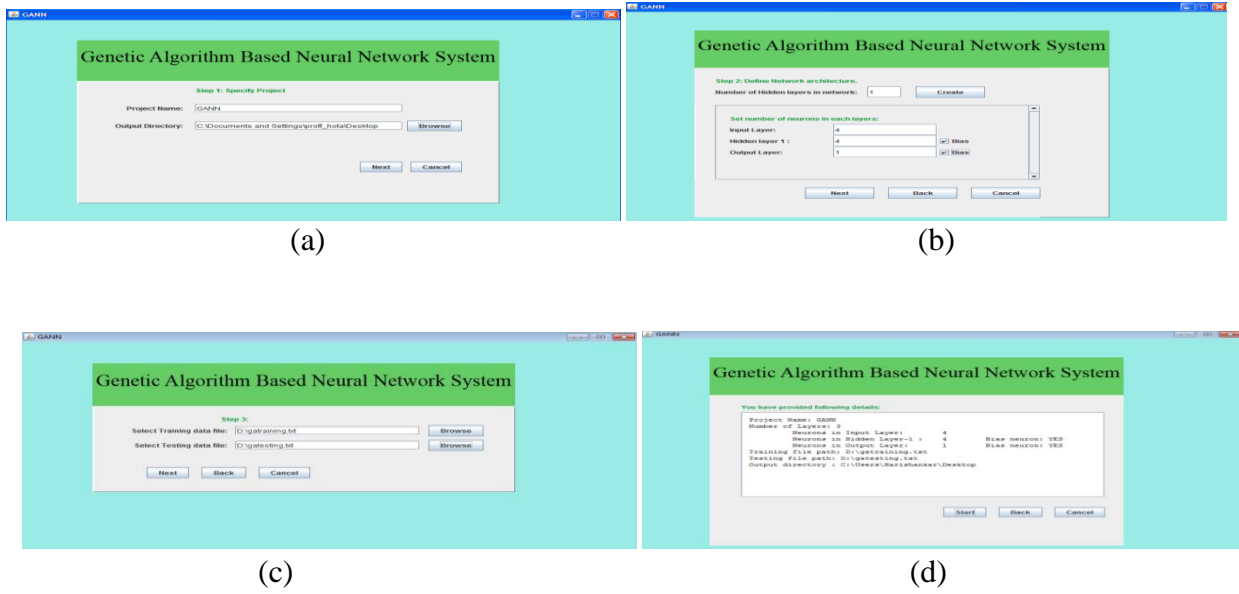
Figure 2: Screen shots of Business Intelligence tool - (a) Project name assignment screen,
(b) Screen to design ANN architecture (c) Screen to feed input /output file, (d) Training process

(a)

(b)

(c)

(d)

SOFTWARE SIMULATION AND RESULTS

This study explores the robustness of the GANN model based on its architecture with two different partitions of Indian stock data. The system was trained using partitioned data with the 4-4-1 and 4-5-1 type of architectures. The model simulation was carried out with the help of software developed by feeding partitioned index data and this process was repeated five times for each index data set. Results were obtained in terms of average of mean absolute percentage error (MAPE) of five runs for both the Indian indices with two different architectures as shown in Table 1. Results suggest that GANN architecture with higher number of neurons in hidden layer yield less error and hence are a robust model for Indian stock data prediction. There is clear variation in MAPE in terms of partition size and type of architecture used. A GANN model (4-5-1 architecture) with 80-20% data partition prediction accuracy was 98.42% (1.58% error) and 98.63% (1.27% error) respectively for BSE30 and BSE100 indices.

Table 1: MAPE of GANN with two different partitions and two architectures							
GANN Architecture	BSE30				BSE100		
	75-25% Partition		80-20% Partition		75-25% Partition		80-20% Partition	
	Training	Testing	Training	Testing	Training	Testing	Training	Testing
4-4-1	2.96	3.13	2.93	2.23	3.03	2.87	2.98	2.68
4-5-1	2.90	3.01	2.80	**1.58**	2.76	2.82	2.13	**1.27**

CONCLUSIONS

In this research work, we have developed a Business Intelligence (BI) tool by integrating artificial neural network (ANN) and genetic algorithm (GA) with two different architectures for Indian stock market prediction. This tool provides GUI to load data, to test GANN model in an interactive way, and provides the facility to design appropriate architecture with different number of neurons in each hidden layer. For both data sets, the accuracy was more precise in case of testing data for 80-20% data partition. Results reveal that architecture with more number of neurons at hidden layer can capture non-linearity nature of index data in a better way.

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(A complete list of references is available upon request from Dinesh K. Sharma at dsharma@uncfsu.edu)

JAVA DATABASE CONNECTIVITY USING SQLITE: A TUTORIAL

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ABSTRACT

Java is one of the most popular programming languages world-wide, controlling everything from web servers to cell phones to automobile engines. Additionally, relational database processing is a mission-critical activity for all types of organizations: business, scientific, educational, and governmental. However, university educators and students often struggle to connect Java programs and databases in a simple and efficient manner. This tutorial presents an extremely straightforward framework for connecting a Java program with an SQLite relational database using any one of these three popular tools: Windows Notepad/Command Prompt, TextPad, and Eclipse.

INTRODUCTION

The purpose of this tutorial is to present a straightforward and relatively easy approach to connect a Java program with a relational database. The Java language is chosen because it is one of the most popular programming languages in both the classroom and workplace. The powerful SQLite relational database engine is used owing to its easy installation and configuration.

Upon surveying several popular Java programming texts (Liang, 2013; Savitch & Mock, 2013, Deitel & Deitel, 2012; Horstman, 2014; Gaddis, 2013; Farrell, 2012), it is found that introductory Java courses usually include these topics: data types, variables, conditions, loops, methods, arrays, and (possibly) basic object-oriented programming (OOP). Intermediate courses delve much deeper into OOP by including the topics of inheritance, polymorphism, exception handling, string processing, file input/output, and graphical user interfaces (GUI's). Some more ambitious Java courses may include data structures, collections, recursion, generics, multithreading, graphics, and (possibly) database programming.

It is evident that the list of potential topics for a one- or two-semester sequence in Java programming can be imposing. The important topic of database programming is often eliminated due to challenging installation and configuration issues. This tutorial provides an easy alternative to what is found in most Java texts. A step-by-step approach is now presented.

INSTALLING THE JAVA JDK

If you do not already have the Java JDK installed follow these instructions:
1. Go to http://www.oracle.com/technetwork/java/javase/downloads/index.html.
2. Click the Java Platform (JDK) download graphic.
3. Click the Accept License Agreement button.
4. Click the Java SE Development Kit link appropriate for your platform (Linux, Mac, Solaris, or Windows) and version (32 bit or 64 bit) and follow the prompts. (To determine the version of your Windows operating system, right-click the Computer icon and select Properties.)

INSTALLING TEXTPAD AND ECLIPSE

In case you are not currently using TextPad (a Java editor) or Eclipse (a Java integrated development environment or IDE) follow these instructions:
1. To install TextPad, visit textpad.com, click the Download tab, and download the 32-bit or 64-bit version as appropriate (Windows only). Follow the prompts to complete the installation.
2. To download Eclipse, visit eclipse.org, click the Download Eclipse link, select an operating system (Windows, Linux, or Mac), and click the appropriate download link (32-bit or 64-bit). Follow the prompts to complete the installation.

TESTING INSTALLATIONS WITH A SIMPLE JAVA PROGRAM

In order to test the installations described in the previous sections, write a simple Hello.java program and run it using (1) Notepad/Command Prompt, (2) TextPad, and (3) Eclipse. These are the three methods that we will use later to test a simple Java database application.

```
public class Hello{
      public static void main( String [] args ){
            System.out.println( "Hello, world!" );
      }
}
```

Figure 2—Class `Hello` to test installation of Java JDK, TextPad, and Eclipse

Create, compile, and run Hello.java using Notepad and Command Prompt

1. Run Notepad and enter the code in Figure 1. Save the file as **Hello.java** on flash drive E: (a flash drive is used for the sake of simplicity—your flash drive letter may be different).
2. Run Command Prompt, enter **e:** at the prompt to move to drive E: and enter **javac Hello.java** at the prompt to compile the program, producing the file Hello.class.
3. Enter **java Hello** at the prompt to run Hello.class. The output, "Hello, world!" should appear. (If Hello.java is on the hard drive, move to that folder in Command Prompt.)

If these steps do not function properly on your computer you may need to edit the Path variable in the Windows operating system so that your computer can find the files **javac.exe** and **java.exe** (located in the **bin** directory of the Java JDK installation). Navigate using Windows File Explorer to the **bin** folder (for example, **C:\Program Files\Java\jdk1.7.0_45\bin**), click the address box in File Explorer and copy this path. Then run Control Panel, click System and Security, click System, click Advanced system settings, click Environment Variables, click Path under System variables, click Edit…, press End to move to the end of the Path string (do NOT delete the current Path string), type a semi-colon at the end of the current Path string, paste the copied path (for example, **C:\Program Files\Java\jdk1.7.0_45\bin**). Then click OK, OK, OK.

Create, compile, and run Hello.java using TextPad

1. Run TextPad, enter the code exactly as shown in Figure 1 within the TextPad editor, and save the file as Hello.java on drive E: (or any other location will do).
2. Press Ctrl-1 to compile the program, then Ctrl-2 to run the program. The output, "Hello, world!" should appear in a separate Command Prompt window. If errors appear in the Tool Output window of TextPad after compiling (Ctrl-1), correct these errors and resave Hello.java. Then re-compile (Ctrl-1) and re-run (Ctrl-2) until no errors exist.

If the commands Ctrl-1 and Ctrl-2 do not function properly in TextPad, you may need to perform the following steps from the TextPad menu to add the Compile and Run tools: Click Configure, Preferences…, Tools, Add, Java SDK Commands, OK. If these tools are still not available, verify the modification of the Path variable as discussed in the previous section.

Create, compile, and run Hello.java using Eclipse

1. Create a folder called 'workspace' (or some other folder name of your choice, but workspace is commonly used) on flash drive E: (or any other location will do). This folder is where Eclipse projects are stored.
2. Launch Eclipse.

3. To set the workspace folder, click Browse in the Workspace Launcher dialog, select the folder 'workspace' on drive E: and click OK, OK.
4. Close the Welcome screen.
5. Click File, New, Java project. Enter a project name (such as 'Test'), click Finish.
6. Click File, New, Class. Enter 'Hello' as the name of the class, click Finish.
7. Enter the code exactly as shown in Figure 1 within the editor window and save the file. If red marks appear in your program, correct those syntax errors and resave the file.
8. When all syntax errors are corrected click the Run button in the Eclipse toolbar.

INSTALLING THE SLQITE DATABASE ENGINE AND JDBC DRIVER

In order for a Java program to communicate with relational database software, such as SQLite, special JDBC (Java database connectivity) drivers are needed. A JAR (Java archive) file that will be used for this purpose is **sqlite-jdbc-3.7.2.jar**, which is available for download on the Internet. This JAR file contains the SQLite database engine as well as Java classes and drivers that enable a Java program to interact with SQLite. Follow these steps to download the JAR file:

1. To download **sqlite-jdbc-3.7.2.jar** visit https://bitbucket.org/xerial/sqlite-jdbc/downloads
2. Right-click the link for **sqlite-jdbc.3.7.2.jar**, select Save target as…, and save this JAR file in the root directory of your flash drive E: (your drive letter may be different). This will enable a Java database application file in this same directory (E:) to interact with the SQLite database engine and SQLite JDBC drivers.
3. In order for the JDBC driver for SQLite to work with TextPad, copy the **sqlite-jdbc-3.7.2.jar** file to this directory in your Java JDK installation: **C:\Program Files\Java\jdk1.7.0_45\jre\lib\ext** (your JDK version may be different).
4. In order for the JDBC driver for SQLite to work with Eclipse, copy the **sqlite-jdbc-3.7.2.jar** file to this directory in your Java JDK installation: **C:\Program Files\Java\jre7\lib\ext** (your JRE version may be different).

RUNNING A JAVA DATABASE APPLICATION WITH SQLITE

Figure 2 presents an extremely simple Java database program that does nothing more than create an SQLite database file and make a connection to it. This is the foundation for eventually creating a useful Java database application using SQLite and possibly a GUI.

```
1   import java.sql.Connection;
2   import java.sql.DriverManager;
3   import java.sql.SQLException;
4
5   public class SQLiteJDBC {
6       public static void main( String args[] ) throws SQLException,
7           ClassNotFoundException {
8           Class.forName( "org.sqlite.JDBC" );
9           String dbFileName = "test.db";
10          Connection conn = DriverManager.getConnection(
11              "jdbc:sqlite:" + dbFileName );
12          System.out.println( "Opened database successfully" );
13      }
14  }
```

Figure 2—Class `SQLiteJDBC` to test database connection

Testing the Sample Java Database Program

1. To test the code in Figure 2 using Command Prompt, enter the code into Notepad and save the file as **SQLiteJDBC.java** on drive E: (your drive letter may be different). Then run Command Prompt, move to drive E: and enter **javac SQLiteJDBC.java** to compile. Then enter **java SQLiteJDBC** to run. Correct syntax errors if necessary. If the program is running correctly, the message in Line 12 should appear in Command Prompt.
2. To test the Java program using TextPad, launch TextPad, enter the code in Figure 2 within the TextPad editor, save the file as **SQLiteJDBC.java** (at any location), press Ctrl-1 to compile and press Ctrl-2 to run. Correct syntax errors if necessary. The confirmation message in Line 12 should appear in a separate Command Prompt window.
3. To test the Java program using Eclipse, launch Eclipse, select the workspace folder on E: (or elsewhere, if desired), create a new Java project (called 'Test DB', for example), create a new class called **SQLiteJDBC**, enter the code in Figure 2 in the Eclipse editor and save the file. If red marks (syntax errors) appear, correct and resave.
4. When no syntax errors exist, click the Run icon in the Eclipse toolbar. The confirmation message in Line 12 should appear in the Console window of Eclipse.

If problems exist with this Java database program, make sure you can successfully run the Hello.java test program described earlier. Then check to ensure that **sqlite-jdbc.3.7.2.jar** was correctly downloaded and copied to the flash drive, the Java JDK, and the Java JRE.

CONCLUSION

This tutorial first presented steps to install the Java JDK, the TextPad editor, and the Eclipse IDE. After creating and testing a simple **Hello.java** program, the procedure for downloading and configuring the SQLite driver file **sqlite-jdbc-3.7.2.jar** was provided. Finally, a simple **SQLiteJDBC.java** database program was demonstrated to verify that a Java program can indeed interact with an SQLite database. The procedures in this tutorial are much simpler and faster than those presented in most Java textbooks which utilize other database engines.

Additional tutorials (or individual research by the student) could provide information on how to execute a wide variety of SQL commands (embedded within a Java program) on an SQLite relational database. One such source of information can be found in the SQLite section of tutorialspoint.com. Additionally, tutorials or Java texts could enable the student to develop a fully functional Java database application that can create, retrieve, update, and delete records within a database table, or provide other useful database operations, all within the context of a GUI.

REFERENCES

Available on request

A META-ANALYSIS AND CRITIQUE OF THE EMPIRICAL LITERATURE ON ENTERPRISE SYSTEMS

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ABSTRACT

The successful implementation and use of various enterprise systems (ES) has provoked considerable interest over the last few years. The purpose of this research study was to review a half decade of relevant dissertation literature in enterprise systems and outline the numerous issues, concerns, as well as benefits and challenges for this platform. This literature critique has been an attempt to provide synopses of relevant research pertaining to the enterprise systems literature. References included in this paper identify and address some of the most germane topics in enterprise systems. A suggested list of future research topics for investigation is provided.

Keywords: Enterprise Systems, Enterprise Resource Planning, Strategy, Competitive Advantage, Business Process Improvement

INTRODUCTION

The successful implementation and use of various enterprise systems (ES) has provoked considerable interest over the last few years. Management has recently been enticed to look toward these new information technologies as the key to enhancing competitive advantage. Replacing legacy IT systems with enterprise-resource-planning (ERP) systems or implementing new enterprise systems that can foster standardized processes--yet remain flexible enough to handle important variations in markets--are becoming a challenging task for many organizations.

The purpose of this study was to review recent relevant literature in enterprise systems and outline the numerous issues, concerns, as well as benefits and challenges for this platform. This paper is intended to provide the reader with quick summaries of significant research (not intended as all inclusive) that is representative of enterprise system literature. A major technique used for data analysis in this paper is meta-analysis which represents the quantitative summary of individual study findings across an entire body of research (Cooper and Hedges, 1994). Meta-

analysis is actually a form of second order research that comes after studies, and goes beyond primary study (Zhao, 1991).

The collection of studies was initiated by computerized searches of a specialized database, ProQuest's Dissertation Abstract and Dissertation Abstract International (DAI), covering the published doctoral dissertations from 2006 to 2011. The key words used were enterprise resource planning (ERP) systems, enterprise systems (ES), and enterprise information systems (EIS). The search was limited to articles in English language.

From the survey of the literature, the authors categorized the continually reappearing subtopics (related to challenges, hurdles as well as benefits) into categories: assessment, design/planning, evaluation/maintenance, education/maintenance, implementation, and strategy. The tabular and graphical representation of the categories is presented in the later section of this manuscript. The constructs streams studied in the literature are identified to provide an overall view of the research findings and conclusions related enterprise systems research area. The categories and constructs will provide useful implications and various perspectives to researchers and practitioners for the effective implementation and management of enterprise systems.

SUMMARY AND CONCLUDING REMARKS

Table 1 presents the recent enterprise systems research by category and year and Figure 1 categorizes the publications by year as well as by author. The table and figure reveal that beginning in 2006, the number of studies in enterprise systems have increased dramatically from 2007 and continued to be the same until now, even though studies peaked in year 2009. Also, noteworthy is that the areas of interests are evenly spread in the entire categories with the highest showing in evaluation/maintenance.
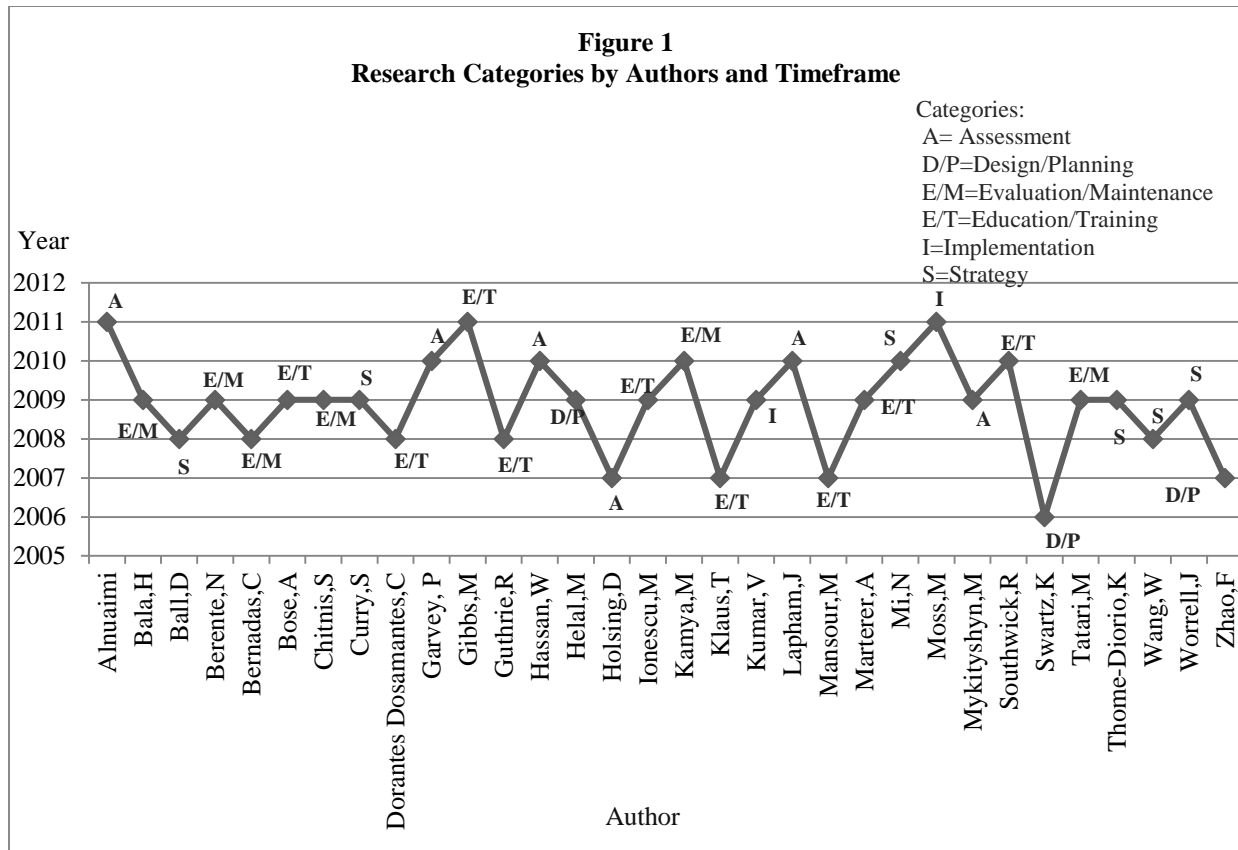
Figure 1
Research Categories by Authors and Timeframe

Table 1							
Subtopics of Research by Year							
Category/Year	2006	2007	2008	2009	2010	2011	Total
Assessment		1		1	3	1	6
Design/Planning	1	1		1			3
Evaluation/Maintenance			1	4	1		6
Education/Training		2	2	3	1	1	9
Implementation				1		1	2
Strategy			2	3	1		6
Total	1	4	5	13	6	3	32

Table 2 outlines four construct streams identified from the literature: (1) finding factors determining successful enterprise systems implementation, design, and upgrade and maintenance, (2) outcomes and challenges of enterprise systems implementation, (3) strategic considerations of enterprise systems (especially, fit to organizational needs), (4) designing and implementing different types of enterprise systems.

Table 2 Construct Streams of Research	
Stream One: Critical Factors and Determinants of Successful Enterprise Systems	
Areas • Implementation • Design and planning • Upgrade • Maintenance	Factors (Individual, technological, and organizational) • Top management characteristics • Legal compliance • Process, IT, and enterprise architecture maturity • Effective communication • Project management • Cultural and behavioral factors • User and designer's perceptions • Intended usage • User involvement and participation
Stream Two: Outcomes and Challenges of ERP implementation	
Outcomes • Organizational changes • Business process improvement • System integration • Effects on higher education institute • Operational outcomes • Financial values (e.g., ROI) • Changes on employee's work life	Challenges • User resistance • Management risk • Multi-agent risk • System uncertainty • Managing malware • Behavioral isolation
Stream Three: Strategic Consideration: Fit to Organizational Needs	
• Fit between ERP functionality and organizational needs • Using process-oriented approach for better fitting • Fit between intended use and the design of ERP • Aligning organizational context to ERP systems	
Stream Four: Designing and Implementing Different Types of Enterprise Systems	
• Distributed enterprise system • Flattened enterprise system • Multi-tier enterprise system	

From the four construct streams, the authors noted that a very comprehensive research listing of topics in enterprise systems have emerged

This literature critique has been an attempt to provide synopses of relevant research pertaining to the enterprise systems literature. References included in this paper identify and address some of the most germane topics in enterprise systems. The summative judgment and recommendation that the authors inferred from the meta-analysis of enterprise systems literature is that enterprise systems is very interdisciplinary in nature and a potentially fruitful research area. As in all reviews of this sort, the authors doubtlessly and inadvertently recognize that some important references may have been overlooked and perhaps others would code some of the

studies differently.   However, the researchers concur that the summary provides a wealth of findings related to the design, development and implementation of enterprise systems.

RECOMMENDATIONS AND FUTURE RESEARCH AGENDAS

With the advent of the Web many integrated business systems have now gained a Web interface which provides a rich research agenda for exploration. Secondly, Cloud Computing is an enterprise system initiative and emerging discipline which is changing the way corporate computing is and will be done in the future. This computing model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released, is another relevant research area that could augment the educational community with theoretical frameworks, empirical studies, and practitioner experiences on enterprise systems in the Cloud. Issues related to change management, security, and processing approaches, associated with migrating to the cloud, are of paramount importance.

Interrelationships and links between the development of mobile applications (smartphones, tablets, 4G) and enterprise systems is an emerging research area. Enterprise software development has traditionally involved client-server applications that have effectively confined business information to enterprise desktops or VPN controlled access. With new options for access, companies are developing processes to build and deploy applications to mobile phones. Developing enterprise mobile applications requires building applications according to specific corporate policies and configuring these applications so they integrate effectively with other enterprise systems.

Mobile application development brings the power of immediate information to a distributed, collaborative workforce, making information available on a device nearly every employee carries, to improve decision making, customer relationship management, as well as supply chain management. The validation and identification of the critical factors required to develop mobile applications and integrate with legacy business systems application development, especially security, end-user experiences, mobile device form factor, mobile operating system, mobile middle-ware and infrastructure demands of the business, are all topics for future study, as organizations strategically align their business processes with enterprise systems for competitive advantage.

A quick look at today's job advertisements solidify that our future business graduates will be less likely to compete successfully or interview for the new positions without business process integration knowledge—discussed in this enterprise systems literature. Our credibility, reputation and visibility as an institution of higher learning is at stake—given that the business student is not only our customer, but also our product. (Hunt, et al 2010).

To survive in the new global, digital economy of ubiquitous computer networks, it is paramount that academicians re-engineer curriculum and update business core offerings that incorporate business process integration, project management, and the fundamentals of enterprise

systems management—given the complexities of business operations. The students will be the true beneficiaries—through internships and immediate job placements—if they are more knowledgeable of integrated business processes. Further research is essential and must be ongoing to ascertain the perceived, key competencies and skills needed by those entering the global workplace of multinational enterprises that have implemented integrated enterprise information systems.

References are available upon request