Elementary Statistics Education in Android System

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Chapter 1. Introduction

- Critical Components of Statistics Education
  - Statistical Concepts
  - Data Analysis

- Importance of Using E-learning
  - Learning Statistical Concepts and Data Analysis Simultaneously
Chapter 1. Introduction

- Advancement of Mobile Technology
  - Communication Technology through mobile devices
  - Mobile Devices also have the computing power as laptop or desktop computers

- Mobile learning (M-learning) through handheld devices
  - New Educational Paradigm
Chapter 2. E-learning and M-learning

- Distance learning to Mobile learning
  - (2009, F. Khaddage, E. Lanham)
Chapter 2.
E-learning and M-learning

- Definition of M-Learning
  - “E-Learning reduces the limitations imposed by location, through the mobility of portable electronic devices” (from Wikipedia)

- Properties of mobile device
  - Unique Operating Systems
  - Expand the Geographical Limits of Education
  - Tied to Mobile Telecommunication Services (3G, 4G and WiFi etc.)
Chapter 2. E-learning and M-learning

Cases of M-Learning

<table>
<thead>
<tr>
<th>M-Learning</th>
<th>Mobile Device</th>
<th>App</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merrill Lynch</td>
<td>Blackberry</td>
<td>GoLearn</td>
<td>Regulations for company</td>
</tr>
<tr>
<td>ACU Univ.</td>
<td>iPhone</td>
<td>Statistics 1</td>
<td>Learning aid</td>
</tr>
<tr>
<td>Harvard Univ.</td>
<td>iPhone, iPod</td>
<td>Blackboard mobile*</td>
<td>Guide for campus life, course of MBA, News, Map, online courses etc.</td>
</tr>
<tr>
<td>MIT Univ.</td>
<td>iPhone, iPod</td>
<td>Blackboard mobile*</td>
<td>Latest News, information of shuttle bus, courses</td>
</tr>
<tr>
<td>Ulsan Univ.</td>
<td>iPhone, iPod</td>
<td>Blackboard mobile*</td>
<td>Online courses, online books, administrative process</td>
</tr>
</tbody>
</table>

Blackboard mobile*; The platform for mobile campus environment
Chapter 2.
E-learning and M-learning

- Education Statistics in E-Learning (1)
- Web-based learning example
Chapter 2. E-learning and M-learning

- Education Statistics in E-Learning (1)
- Web-based learning example
# Chapter 2.
## E-learning and M-learning

- **Web-based learning Web Sites**

<table>
<thead>
<tr>
<th>Website</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>BrightStat</td>
<td>Statistical concepts, data analysis tools</td>
</tr>
<tr>
<td>SOCR (Statistics Online Computational Resource)</td>
<td>Statistical concepts, data analysis tools, Simulation tools</td>
</tr>
<tr>
<td>Qual (Resources for Qualitative Research)</td>
<td>Research of Quantitative data analysis</td>
</tr>
<tr>
<td>Max QDA</td>
<td>Theory of cell phone message data analysis</td>
</tr>
<tr>
<td>MATH30 (for Linear Model)</td>
<td>Theory of Statistical model, example data set</td>
</tr>
<tr>
<td>Vista</td>
<td>Powerful graphic tools</td>
</tr>
</tbody>
</table>
Chapter 2. E-learning and M-learning

- Education Statistics in E-Learning (2)
- Computer-based learning
  - Statistical computer packages
    - (R, SAS and SPSS etc.)
Chapter 2.
E-learning and M-learning

- Relative limitations
  - Accessibility
  - Program
  - Device
  - Location of use
Chapter 2. E-learning and M-learning

- Considerations for a mobile environment
  - 1) Contents
    - ex. Naver portal website
## Considerations for a mobile environment

2) Specifications of device for Android Devices

<table>
<thead>
<tr>
<th>Corp.</th>
<th>Model</th>
<th>CPU</th>
<th>RAM</th>
<th>Size of screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung</td>
<td>Galaxy S</td>
<td>1GHz</td>
<td>512M</td>
<td>4 inch</td>
</tr>
<tr>
<td>Samsung</td>
<td>Galaxy S2</td>
<td>1.2GHz</td>
<td>1 G</td>
<td>4.3 inch</td>
</tr>
<tr>
<td>HTC</td>
<td>Nexus One</td>
<td>1GHz</td>
<td>512M</td>
<td>3.7 inch</td>
</tr>
<tr>
<td>Motorola</td>
<td>Droid</td>
<td>550Mhz</td>
<td>256M</td>
<td>3.7 inch</td>
</tr>
</tbody>
</table>

3) How to use wireless communication
Chapter 3. Elementary Statistics Education in Android

- Android System
  - Open source
  - Using Java language
  - Easy to write and revise
Chapter 3. Elementary Statistics
Education in Android

- Apps for education statistics in Android market
- Example 1
Chapter 3. Elementary Statistics

- Apps for education statistics in Android market
- Example 2
### Statistical Apps in the Android Market

<table>
<thead>
<tr>
<th>Type</th>
<th>App name</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data analysis and visualization</td>
<td>STA: Statistical toolbox</td>
<td>Distribution tool, statistical tests, Descriptive stats</td>
</tr>
<tr>
<td></td>
<td>StatCalc Lite</td>
<td>Descriptive stats, charts tool</td>
</tr>
<tr>
<td></td>
<td>Mobile Statistics Pro</td>
<td>ANOVA, Beta function, Scientific Calculator, Effective size</td>
</tr>
<tr>
<td>Learning Statistical concept</td>
<td>Business statistics</td>
<td>Case studies</td>
</tr>
<tr>
<td></td>
<td>General statistics glossary</td>
<td>Glossary</td>
</tr>
<tr>
<td></td>
<td>Statistics Review free</td>
<td>Practice problems</td>
</tr>
</tbody>
</table>
Chapter 3. Elementary Statistics Education in Android

Integrated App is Needed
- Statistical concepts + data analysis
- Complimentary components for efficient learning
Chapter 3. Elementary Statistics
Education in Android

- Blended Learning
  - In the class
    - Reading materials
    - Data analysis tools
  - Various Locations
    - Discussion
  - Real time learning

Student ➔ Instructor

Application
Chapter 3. Elementary Statistics
Education in Android

- Blended Learning
- Self-learning tool
  - Games (Quiz, Flash cards etc.)
  - Glossary
  - Reading materials
Chapter 4. Implementation

Application (App)

Statistical concepts

Using web source (Wiki)

Data Analysis

Calculating descriptive statistics

Complementary functions

Quiz

Glossary

Notes

Flash Cards
Chapter 4. Implementation

- User Interface (UI) - Android - View
Chapter 4. Implementation

- User Interface (UI) – View Container or Layout
Chapter 4. Implementation

- User Interface (UI)
  - Main screen
    - Learning Statistics
    - Quiz
    - Notes
    - Flash Cards
Chapter 4. Implementation

- User Interface (UI)
  - TabHost (ViewContainer) : Efficient UI for Learning

**Random variable**
Random variable, Discrete random variable, Continuous random variable

**Probability Distribution**
Probability Distribution, Probability density function, Cumulative distribution function

**Expected value and Moment**
Central tendency, Expected value, Mean value or Average value, Median, Mode

**Statistical hypothesis testing**
This article is about frequentist hypothesis testing which is taught in introductory statistics. For Bayesian hypothesis testing, see Bayesian inference.

A statistical hypothesis test is a method of making decisions using data, whether from a controlled experiment or an observational study (not controlled). In statistics, a result is called statistically significant if it is unlikely to have occurred by chance alone, according to a pre-determined threshold probability, the significance level. The phrase "test of significance" was coined by Ronald Fisher: "Critical tests of this kind may be called tests of significance, and they were not introduced as a substitute for tests of coherence and explanation."


Chapter 4. Implementation

- Statistical Concepts
  - Learning Thorough Keywords

![Statistical Concepts Diagram]

- Probability
- Random Variable and Distribution
- Special Parametric Distribution
- Sampling Distribution
- Estimation
- Testing
- Regression
Chapter 4. Implementation

- Statistical Concepts
  - Learning Thorough Keywords

- Central tendency
- Expected Value
- Mean value or Average value
- Median
- Mode
- Dispersion
- Range
- Variance
- Standard Deviation
Chapter 4. Implementation

- Data Analysis Tools
  - Calculating Descriptive Statistics
Chapter 4. Implementation

- Data Analysis Tools
  - Supplemental tools
    - Graphical or statistical testing tool etc.
Chapter 4. Implementation

TGG For Taiwan

Probability

Random Variable and Distribution

Special Parametric Distribution

Sampling Distribution

Estimation

Testing

Regression
Chapter 4. Implementation

- Quiz
  - Learning Statistical Concepts Through a Variety of Quizzes

(1/5) Suppose a normal deck of 52 cards is shuffled randomly. What is the probability that the third card from the top is the Ace of Diamonds?

A 1/49
B 1/50
C 1/51
D 1/52
E 1/56

Select from A, B, C, D, E.
Chapter 4. Implementation

- Notes
  - Students can use this component to write a simple memo
Chapter 4. Implementation

Glossary - Definition of Statistical Terms

- Bias: A term which refers to how far the average statistic lies from the parameter it is estimating, that is, the error which arises when estimating a quantity. Errors from chance will cancel each other out in the long run, those from bias will not.
Chapter 5. Conclusion

- Simple and efficient learning Elementary Statistics Education through M-learning

- An Integrated App for Statistics Education
  - Statistical Concepts, Data Analysis and Complementary Functions
  - Easy to enhance any components of App

- Blended learning Through Integrated App
  - Between Instructor and Student
  - Self-learning
THANK YOU!!