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Software Design Android (GIS) for Tourist Destination Seekers in Palembang City Using Rasch Model Measurements

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Abstract
Rapid change and growth of technology such as automatization and computerization in many types of business according to information technology communities and practitioners are demanding us to be well-prepared in facing the evolution like mobile devices especially android. Android is a mobile operating system used for touch screen based smart phones and computer tablets. The strength of GPS based android devices is in making it easy for users to access many kinds of information of tourist destinations consisting all facilities around the places. The development of this android based application is using Java Android programming language and designed by using RUP (Rational Unified Process) as the development method with Unified Modelling Language (UML) concept. The purpose of this research is to produce a Geographic Application for tourist guidance in Palembang city containing tourist objects list, public places list, transportations list, culinary places list and also other features that will help tourists to find the most effective and efficient tourist destinations. The Rasch Model measurements uses 74 respondents, to test the data using the Rasch Model measurements with the Ministep application. In the aspect of reliability, for person reliability the value is 0.89.0.90, producing a very good value. While for reliability items the value is 0.82 and 0.84 produces a good value. while the Cronbach alpha index also produces a Cronbach Alpha value yields a value of 0.93 (produces a very good value). Determination of sample size uses the Item Measure table based on the accuracy of confidence measurements (95%).

***Keywords**: android, UML, Rasch Model, GPS*

Introduction

Public facilities is a service that is often used by public places in connection with, for example, government, economy and more. The mobility of a citizen has been one of many factors that explain and describe the need for public facilities to help people get the information they really need. One of them is information relating to tourist destinations such as locations or facilities around the place because of the main problem and first is the lack of information available about public facilities and which they really need. In this previous research about the development of Web-Based Geographic Information System which is for mapping parks in Indragiri Hilir Regency, the aim is to create a media for the promotion of recreational areas and is designed to be built by the government to help a community service in finding parks and green open spaces using and coordinate accurate points along with detailed information in one of the GIS park mapping, SDLC is a method used for system development as identification software and UML as a model that uses OOP concepts to assist researchers in developing systems. As for the application of this Geographic Information System for park mapping, it also provides space for both the government to and promote recreational and tourism areas and also facilitates people in finding the right location and very detailed information about all available parks and other future destinations under construction.[1]

Development of an Operating System, one of which is for Android-based mobile phones, is used continuously to increase, for example a software used to help tourists who find tourist destinations in Semarang, one of these application designs that can provide a tourist attraction information that was built together with a brief description with displays a map of the routes closest to the tourist destination to be handled through a Google Maps APIs. [2]. a location agent has the development to search for the development of a Web-Based Geographic Information System (GIS) in Padang built using the waterfall method. This development process begins with analyzing requirements, designing systems, implementing and testing systems. The purpose of this analysis is a requirement to collect all the data needed to build a system. System design which involves architectural design, database design and

user interface, is implemented using a PostgreSQL database with PostGIS extensions including PHP and JavaScript programming. [2]. Tourism is a valuable aspect for an area other than to improve local welfare. The city of Semarang has many tourist destinations, of course, in developing existing facilities can provide a growth of the tourism sector. [3]. One of tourism in Pacitan Regency is tourism which is from Pacitan's main income sector. where the geographical location of the district adjacent to the Indian Ocean is an advantage for tourism growth in the beach and cave sector. But with controls to find the right location is a challenge without the right tools. Besides developing some types of static web sites not for solutions used to gather information from new sites that are relatively new and difficult to reach for example Producing printed maps or brochures of sites can be time-consuming and expensive, not to mention updates that are needed in the future. [4]. The main objective of this research is to design and develop an application, and the Android-based Geographic Information System is expected to help tourists find their way to their destination along with the information they want. [6].

This research uses the Rasch Measurement Model in which many aspects involving three aspects consist of students, items and assessors and are analyzed using Facet 3.64.0. The assessor consisted of one of 17 lenders and the subject assessed was 194 student data in year one that took 2008/2009 at the higher education institution. The established instrument shows confidence for the ninth construction, which is between 0.95-0.96. The items were also examined in terms of data alignment using the Rasch Measurement Model by looking at the mean squared clothing and the average squared infit.[5]. Rasch's model of instrument validity and reliability is research. Three sets of instruments were used for research and were developed in this study. incorrectly used Felder-Solomon Learning Style Index (ILS) is very important to know a student's learning style abilities as well as Students' Perception in implementing the Cognitive Dimension was developed to complete identifying student perceptions of their cognitive abilities, and Student CMAT is used to find and measure student mastery in certain subjects. This study aims to produce empirical evidence of validity and reliability using the Rasch Model. A small survey was conducted consisting of 28 vocational students enrolled in the Building Construction course as well as ILS consisting of four constructions, while from SPCD and CMAT were used to validate based on three constructs and the reliability value was based on Cronbach alpha with an appropriate range of grades. The construct validity was analyzed based on the Rasch model with the value of infit and mean square outfit (MNSQ). Three experts in the subject of building construction to check the validity of SPCD and CMAT content. Appraisal agreements can be calculated as percentage-agreements. Percent-agreement statistics can be calculated and explained easily and the Rasch Model is suitable for application in the instrument validation process due to the concept of item response theory.[6]

The limitation of this research is to design the software using the UML (Unified Modeling Language) method consisting of use cases, activity diagrams and class diagrams based on mobile android based geographic information systems (GIS) software development for tourist destination seekers in Palembang city using Rasch model testing by using usability criteria consisting of Learnability, Efficiency, Memorability, Feww error, Satiisfaction

SOFTWARE

The programmer is to develop applications or software without procedures or development stages in the past. As the scale of the system grows, it creates more challenges in every aspect. System Development Life Cycle (SDLC) began in the 1960s to develop large-scale functional systems for businesses at that time. All systems are built to manage any information on company activities that have the potential to have large amounts of data.[7]

Software is a kind of computer program that isolated with documentation such as needs, models, designs and user manuals. Any computer programs that is not isolated with the documentations cannot be called software yet. (Rosa A.S, M. Salahudin; 2011: 2-4). The definition of software are as follows: (1) command (computer program) which can show the exact output when it runs. (2) Data structures that allows a program to change an information. (3) Descryptive information in hardcopy or softcopy that explains how a program works including the benefits (Pressman: 2010: 4). Based on opinions above, software is a program created and run on the operating system to display the desired information and results.

ANDROID

Android is a Linux-based operating system for Android-based mobile devices where Android provides an open platform for developers to create their applications. The OS is a modified version of a Linux Kernel 2.6. Since Android was also released, various updates have been made in the form of bug fixes and also the addition of new features. Android is also a very complete platform, for example from the operating system, application and development tools, for example the android application market, and very high support from the open source community of the world, so that Android continues to allow growth quickly, both in terms of technology and in terms of the number device in the world (Safaat H, 2012:1-3).

Android software system is actually a stack consisting of several layers from the closest to the hardware to those that interact directly with the user. This means that Android is not just a framework but can be divided into several layers which can be seen in the following image.

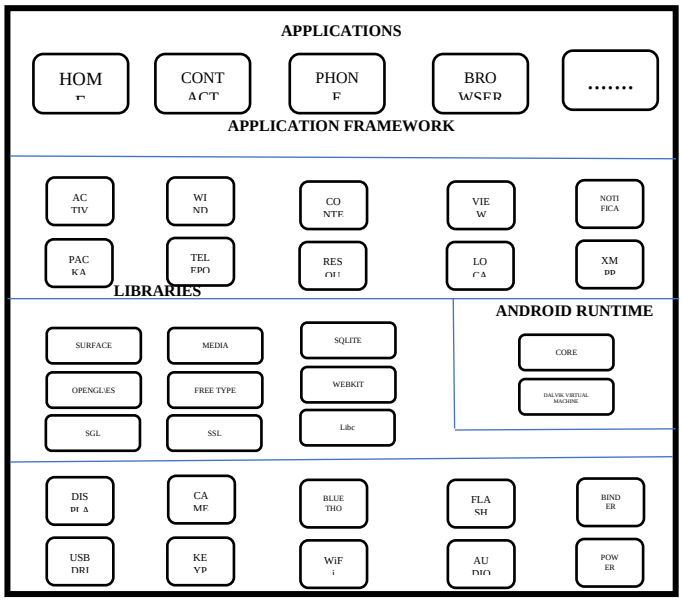


Figure 1. Android operating System Layers.

DESIGN

System requirements analysis is a stage that outlines in detail about the structural specifications, content, and data requirements related to the system to be made before carrying out the design stage. An application designer must analyze what is needed to build an application that will be created as a tool in providing the geographical tourism of the city of Palembang which is devoted to the search for culinary tourism locations, hotels, transportation and tourist attractions that can be accessed by mobile especially android mobile. This Researchers use the Unified Modeling Language modeling language to design specifications, visualization, construction and object documentation in system development.

DATA DESCRIPTION

The data used to test software design were 74 respondents in rasch model test

RESEARCH METHODOLOGY

Unified Modelling Language (UML)

UML stands for "Unified Modeling Language" is a modeling method that is used visually for facilities and design of an object-oriented system, and other definitions UML is a language that has been used in standards in visualization, design and documentation of software systems where UML is currently a standard language in writing blue print in software.[8]

Scope Research

Scope research only design software that consists of tourist objects, public places, transportations, culinary places.

Use case admin

Admin can see and manage the system

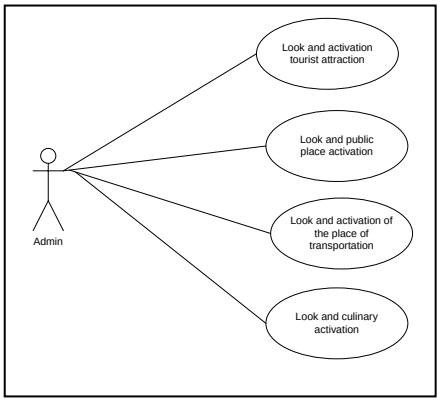


Figure 2. Use case admin

Figure 2 explains the admin can manage and activate tourism objects, public places, transportation places, and culinary places

Use case User

Users can only see and choose a tourist attraction in Palembang

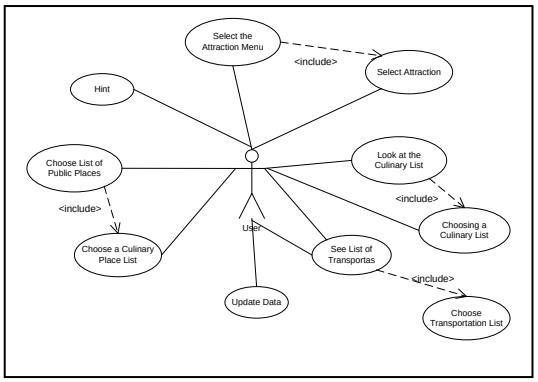


Figure 3. Use case User

Figure 3 explains the user can only see attractions, public places, transportation, and culinary places

Diagram Activity

Activity diagram describes the process of activities carried out by users of the system to be used as shown in Figure 4.

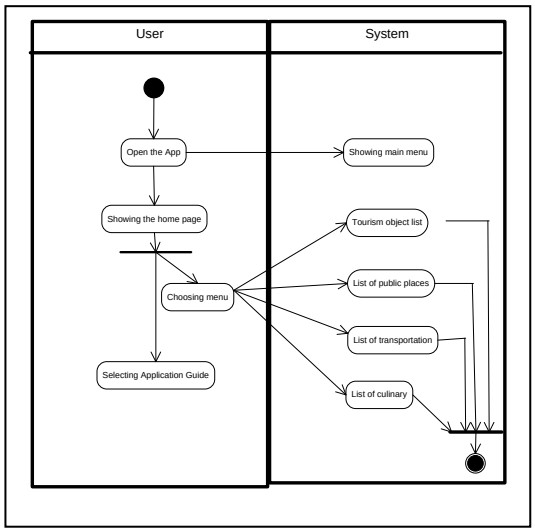


Figure 4.Activity Diagram

Figure 4 explains the activity diagram between the user and the system that the software will build

Class Diagram

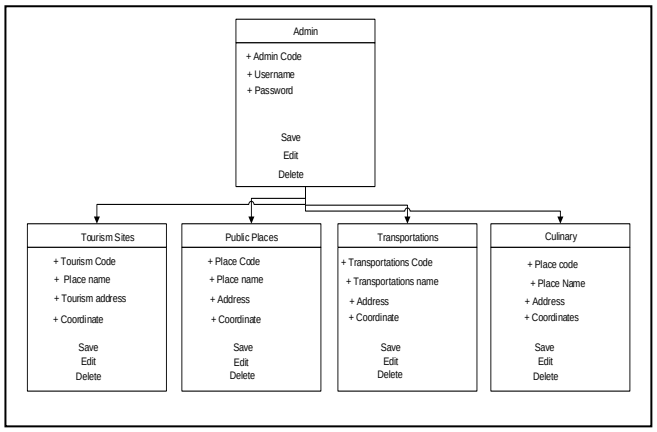


Figure 5 class diagram

Interface Design

The design of the menu page that explains the list of choices of attractions in Palembang City as shown in figure 6 below.

Figure 6 Menu page design

Figure 6 explains the design of a software menu consisting of tourist destinations, transportation, culinary, public areas, intrusions

Rasch Measurement Model

The Rasch Model testing uses 74 respondents, to test using the Rasch Model Testing with the application. The following uses the Rasch model testing using Table 1 Item Measure :

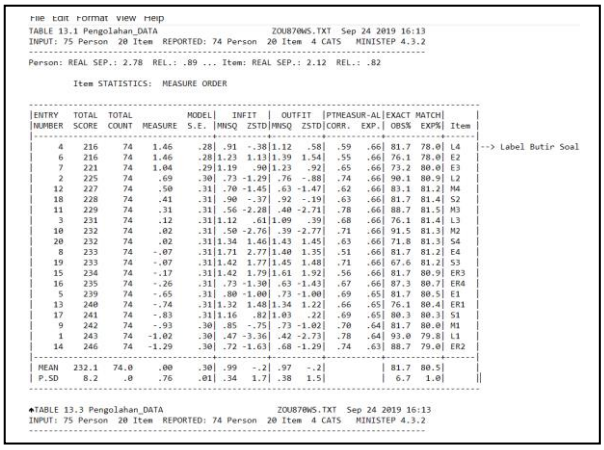


Figure 7. Respondents

To find out the level of suitability of the item (item fit), the meaning of which is in accordance with the ideal model of measurement, we use item fit order, in the table below it appears that the item fit indicator for all items is outfit means square (0.5 <MNSQ <1 , 5), Z-Standard Outfit (-2.0 <ZSTD <+2.0) and Point measure correlation (0.4 <pt Measure Corr <0.85), do not show any problems, in other words all which can be understood by students. Can be seen in figure 8 below:

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
8	233	74	-.07	.31	1.71	2.77	1.40	1.35	A .51	.66	81.7	81.2	E4
15	234	74	-.17	.31	1.42	1.79	1.61	1.92	B .56	.66	81.7	80.9	ER3
19	233	74	-.07	.31	1.42	1.77	1.45	1.48	C .71	.66	67.6	81.2	S3
20	232	74	.02	.31	1.34	1.46	1.43	1.45	D .63	.66	71.8	81.3	S4
6	216	74	1.46	.28	1.23	1.13	1.39	1.54	E .55	.66	76.1	78.0	E2
13	240	74	-.74	.31	1.32	1.48	1.34	1.22	F .66	.65	76.1	80.4	ER1
7	221	74	1.04	.29	1.19	.90	1.23	.92	G .65	.66	73.2	80.0	E3
17	241	74	-.83	.31	1.16	.82	1.03	.22	H .69	.65	80.3	80.3	S1
3	231	74	.12	.31	1.12	.61	1.09	.39	I .68	.66	76.1	81.4	L3
4	216	74	1.46	.28	.91	-.38	1.12	.58	J .59	.66	81.7	78.0	L4
18	228	74	.41	.31	.90	-.37	.92	-.19	j .63	.66	81.7	81.4	S2
9	242	74	-.93	.30	.85	-.75	.73	-1.02	i .70	.64	81.7	80.0	M1
5	239	74	-.65	.31	.80	-1.00	.73	-1.00	h .69	.65	81.7	80.5	E1
2	225	74	.69	.30	.73	-1.29	.76	-.88	g .74	.66	90.1	80.9	L2
16	235	74	-.26	.31	.73	-1.30	.63	-1.43	f .67	.66	87.3	80.7	ER4
14	246	74	-1.29	.30	.72	-1.63	.68	-1.29	e .74	.63	88.7	79.0	ER2
12	227	74	.50	.31	.70	-1.45	.63	-1.47	d .62	.66	83.1	81.2	M4
11	229	74	.31	.31	.56	-2.28	.40	-2.71	c .78	.66	88.7	81.5	M3
10	232	74	.02	.31	.50	-2.76	.39	-2.77	b .71	.66	91.5	81.3	M2
1	243	74	-1.02	.30	.47	-3.36	.42	-2.73	a .78	.64	93.0	79.8	L1
MEAN	232.1	74.0	.00	.30	.99	-.2	.97	-.2			81.7	80.5	
P.SD	8.2	.0	.76	.01	.34	1.7	.38	1.5			6.7	1.0	

Figure 8. item fit

It can be seen in the table above that the item ER3 item, which contains one mismatch criteria is a Mean-Square infitit that is greater than 1.5

Reliability

To test data processing using Reliability, using Summary statistics consisting of :

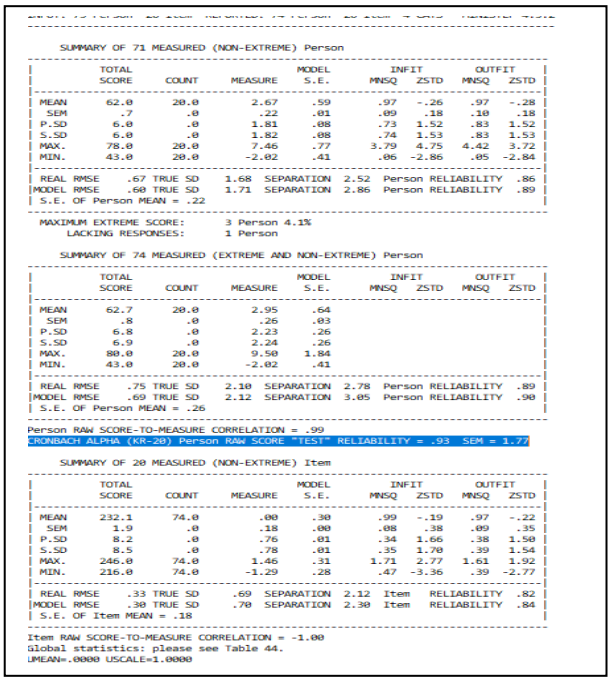
1. Reliabilitas person
2. Reliabilitas item
3. Alpha Cronbach

Value Person Reliability and Item Reability:

1) <0.67 results in Weak Value
2) 0.67-0.80 Produces Fair Value
3) 0.81-0.90 Produces Good Value
4) 0.91 - 0.94 Produces Very Good Value
5) 0.94 Produces Special Value

Cronbach Alpha value (measuring Reliabiltas ie, interactions between person and item as a whole) viz

1) <0.5 yields a Poor value
2) 0.5-0.6 Produce Bad Value
3) 0.6-0.7 Produce Fair Value
4) 0.7 - 0.8 Produces Good Value
5) > 0.8 Produces Very Good Value



SUMMARY OF 71 MEASURED (NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	62.0	20.0	2.67	.59	.97	-.26	.97	-.28
SEM	.7	.0	.22	.01	.09	.18	.10	.18
P.SD	6.0	.0	1.81	.08	.73	1.52	.83	1.52
S.SD	6.0	.0	1.82	.08	.74	1.53	.83	1.53
MAX.	78.0	20.0	7.46	.77	3.79	4.75	4.42	3.72
MIN.	43.0	20.0	-2.02	.41	.06	-2.86	.05	-2.84

REAL RMSE .67 TRUE SD 1.68 SEPARATION 2.52 Person RELIABILITY .86
MODEL RMSE .60 TRUE SD 1.71 SEPARATION 2.86 Person RELIABILITY .89
S.E. OF Person MEAN = .22

MAXIMUM EXTREME SCORE: 3 Person 4.1%
LACKING RESPONSES: 1 Person

SUMMARY OF 74 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	62.7	20.0	2.95	.64				
SEM	.8	.0	.26	.03				
P.SD	6.8	.0	2.23	.26				
S.SD	6.9	.0	2.24	.26				
MAX.	80.0	20.0	9.50	1.84				
MIN.	43.0	20.0	-2.02	.41				

REAL RMSE .75 TRUE SD 2.10 SEPARATION 2.78 Person RELIABILITY .89
MODEL RMSE .69 TRUE SD 2.12 SEPARATION 3.05 Person RELIABILITY .90
S.E. OF Person MEAN = .26

Person RAW SCORE-TO-MEASURE CORRELATION = .99
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .93 SEM = 1.77

SUMMARY OF 20 MEASURED (NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	232.1	74.0	.00	.30	.99	-.19	.97	-.22
SEM	1.9	.0	.18	.00	.08	.38	.09	.35
P.SD	8.2	.0	.76	.01	.34	1.66	.38	1.50
S.SD	8.5	.0	.78	.01	.35	1.70	.39	1.54
MAX.	246.0	74.0	1.46	.31	1.71	2.77	1.61	1.92
MIN.	216.0	74.0	-1.29	.28	.47	-3.36	.39	-2.77

REAL RMSE .33 TRUE SD .69 SEPARATION 2.12 Item RELIABILITY .82
MODEL RMSE .30 TRUE SD .70 SEPARATION 2.30 Item RELIABILITY .84
S.E. OF Item MEAN = .18

Item RAW SCORE-TO-MEASURE CORRELATION = -1.00
Global statistics: please see Table 44.
UMEAN=.0000 USCALE=1.0000

Figure 9. Summary statistics

In the aspect of reliability, for person reliability the value is 0.89.0.90, producing a very good value. While for reliability items the value is 0.82 and 0.84 produces a good value. while the Cronbach alpha index also produces a Cronbach Alpha value yields a value of 0.93 (produces an excellent value). For more specification explanation

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	62.0	20.0	2.67	.59	.97	-.26	.97	-.28
SEM	.7	.0	.22	.01	.09	.18	.10	.18
P.SD	6.0	.0	1.81	.08	.73	1.52	.83	1.52
S.SD	6.0	.0	1.82	.08	.74	1.53	.83	1.53
MAX.	78.0	20.0	7.46	.77	3.79	4.75	4.42	3.72
MIN.	43.0	20.0	-2.02	.41	.06	-2.86	.05	-2.84

REAL RMSE .67 TRUE SD 1.68 SEPARATION 2.52 Person RELIABILITY .86
MODEL RMSE .60 TRUE SD 1.71 SEPARATION 2.86 Person RELIABILITY .89
S.E. OF Person MEAN = .22

MAXIMUM EXTREME SCORE: 3 Person 4.1%
LACKING RESPONSES: 1 Person

SUMMARY OF 74 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	62.7	20.0	2.95	.64				
SEM	.8	.0	.26	.03				
P.SD	6.8	.0	2.23	.26				
S.SD	6.9	.0	2.24	.26				
MAX.	80.0	20.0	9.50	1.84				
MIN.	43.0	20.0	-2.02	.41				

REAL RMSE .75 TRUE SD 2.10 SEPARATION 2.78 Person RELIABILITY .89
MODEL RMSE .69 TRUE SD 2.12 SEPARATION 3.05 Person RELIABILITY .90
S.E. OF Person MEAN = .26

Figure 10. Summary statistics

Person Measure = + 2.95 logit shows the average respondent's value in the instrument is more the tendency of respondents to agree with statements in various items.

Determination of sample size

Rasch Modeling: determination of sample size based on measurement accuracy (1.0 logit scale or 0.5 logit); confidence level (95% or 99%.

Table 1. Sample

Stable item calibration inside	Level of confidence	Sample Range	Sample Size
±1 logit	95%	16 -36	30
±1 logit	99%	27-61	50
±0,5 logit	95%	64-144	100
±0,5 logit	99%	108-243	150

(Sumber: Linacre, 1994. 'Sample Size and Item Calibration Stability'. Rasch Measurement Transactions, 7:4 p.328).[9]

The table below shows the determination of sample size using the Item Measure table based on measurement accuracy (1.0 logit scale or 0.5 logit); confidence level (95%) Using 74 Respondents

INPUT: 75 Person 20 Item REPORTED: 74 Person 20 Item 4 CATS MINISTEP 4.3.2

Person: REAL SEP.: 2.78 REL.: .89 ... Item: REAL SEP.: 2.12 REL.: .82

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
4	216	74	1.46	.28	.91	-.38	1.12	.58	.59	.66	81.7	78.0	L4
6	216	74	1.46	.28	1.23	1.13	1.39	1.54	.55	.66	76.1	78.0	E2
7	221	74	1.04	.29	1.19	.90	1.23	.92	.65	.66	73.2	80.0	E3
2	225	74	.69	.30	.73	-1.29	.76	-.88	.74	.66	90.1	80.9	L2
12	227	74	.50	.31	.70	-1.45	.63	-1.47	.62	.66	83.1	81.2	M4
18	228	74	.41	.31	.90	-.37	.92	-.19	.63	.66	81.7	81.4	ST3
11	229	74	.31	.31	.56	-2.28	.40	-2.71	.78	.66	88.7	81.5	M3
3	231	74	.12	.31	1.12	.61	1.09	.39	.68	.66	76.1	81.4	L3
10	232	74	.02	.31	.50	-2.76	.39	-2.77	.71	.66	91.5	81.3	M2
20	232	74	.02	.31	1.34	1.46	1.43	1.45	.63	.66	71.8	81.3	I0020
8	233	74	-.07	.31	1.71	2.77	1.40	1.35	.51	.66	81.7	81.2	E4
19	233	74	-.07	.31	1.42	1.77	1.45	1.48	.71	.66	67.6	81.2	ST4
15	234	74	-.17	.31	1.42	1.79	1.61	1.92	.56	.66	81.7	80.9	ER3
16	235	74	-.26	.31	.73	-1.30	.63	-1.43	.67	.66	87.3	80.7	ER4
5	239	74	-.65	.31	.80	-1.00	.73	-1.00	.69	.65	81.7	80.5	E1
13	240	74	-.74	.31	1.32	1.48	1.34	1.22	.66	.65	76.1	80.4	ER1
17	241	74	-.83	.31	1.16	.82	1.03	.22	.69	.65	80.3	80.3	ST1
9	242	74	-.93	.30	.85	-.75	.73	-1.02	.70	.64	81.7	80.0	M1
1	243	74	-1.02	.30	.47	-3.36	.42	-2.73	.78	.64	93.0	79.8	LI
14	246	74	-1.29	.30	.72	-1.63	.68	-1.29	.74	.63	88.7	79.0	ER2
MEAN	232.1	74.0	.00	.30	.99	-.2	.97	-.2			81.7	80.5	
P.SD	8.2	.0	.76	.01	.34	1.7	.38	1.5			6.7	1.0	

Figure 11. Item Measure

The table above uses Item Statistics where the value of 0.0 means better quality for the 95% confidence level, while for Measure = Logic Value of items for L4 items with +1.46 logit shows this is the item most difficult for respondents to agree on in the given nationalism instrument , while the ER2 item = -1.29 logit is **Category Probabilities Or Probabilty Curva** the easiest item to approve **.**

In the curve below shows if value 4 is very agree, while value 3 shows agree, value 2 shows disagree, while value 1 strongly disagree can be seen probability curve below:

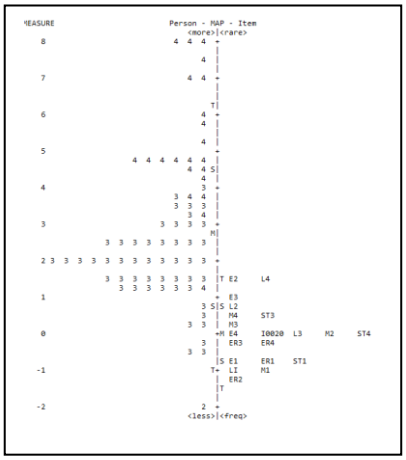


Figure 12. Probabilty Curva

CONCLUSION

1. This research only design the software using the UML (Unified Modeling Language) method consisting of use cases, activity diagrams and class diagrams based on mobile android based geographic information systems (GIS) software development for tourist destination seekers in Palembang city using testing Rasch model using usability
2. UML is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems. UML is a modeling

language used to model software and non-software systems. Although UML is used for non-software systems, the emphasis is on modeling OO software applications. Most of the UML diagrams discussed so far are used to model different aspects such as static, dynamic. Now whatever be the aspect, the artifacts are nothing but objects. If we look into class diagram, object diagram, collaboration diagram, interaction diagrams all would basically be designed based on the objects.

3. Testing the Rasch model using 74 respondents, to test the data using the Rasch Model Testing with the Ministep application. In the aspect of reliability, for person reliability the value is 0.89.0.90, While for reliability items the value is 0.82 and 0.84. while the Cronbach alpha index also produces a Cronbach Alpha value yields a value of 0.93, so it was concluded that the design of this software can produce very good value.
4. Based on research that has been done, it can be concluded that the design of the Android mobile tourism system can facilitate tourists both domestic and foreigners in obtaining information about tourist sites, culinary, transportation and public places.

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