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Multilingual Android based application for Meteorological Units Conversions and Calculation of empirical relationship

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Abstract- Meteorological data can be expressed in several units. Various climatological and physical parameters are used for calculating evapotranpiration, irrigation demand, soil moisture etc. from meteorological data. Some of these data are directly measured in weather stations. Other parameters are related to commonly measured data on field and can be derived with the help of a direct or empirical relationship. Many a times on field and on time calculation or conversion are required. Android is a mobile based, free of cost operating system; used by majority of the mobile manufactures and equally appreciated and used by handheld users. Person working on field collects data and an android mobile based multilingual converter and calculator can assist in solving major issues pertaining to on field and on timeconversions and calculation in regional language.

Keywords: Climate change, Meteorological unit calculation and conversion, Multilingual, Android.

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I. INTRODUCTION

Climate change scenarios could generally contribute more uncertainties than biophysical processes in projecting climate change impacts on crop productivity[1]. Weather plays an important role in agricultural production. Studies on climate affects and adjustment strategies are increasingly becoming major areas of scientific concern, e.g. effect on the production of crops such as maize, wheat and rice [2], [3], [4], [5], [6], [7] and[8] , water resources in the river basin catchments [9], [10], [11] and [12], forests [13], industry [14].It has a profound influence on the growth, development and yields of a crop. Even on a climatological basis weather factors show spatial variations in an area at a given time, temporal variations at a given place and year to year variations for a given place and time[15].

In order to get better quality and quantity of yield various meteorological weather parameters should be considered over short time periods and year-to-year fluctuations at a place over the selected interval. Some weather parameters viz. moisture, radiation etc. recorded by measuring instruments need to go through various computation to derive empirical relationship and to predict something or to be utilized effectively. Such calculation will be of much more use if it is available on time and are handy.

This Paper provides description of Android mobile based multilingual meteorological weather parameter convertor and calculator developed by College of Agriculture Information Technology, Anand Agricultural University, Anand, and Gujarat, India. The Android mobile based Meteorological weather parameter convertor and calculatorassist user having mobile with android operating system to perform various conversions and calculation pertaining to meteorological weather parameters. This program will provide various facilities provided by multiple paid Google apps in multilingual Indian languages.

II. MATERIAL AND METHODS

Multilingual Meteorological Weather parameter Converter and Calculator is a mobile application developed using Android software development kit and working on a mobile having an open source android operation system. Android is a Linux-based operating system designed primarily for touch-screen mobile devices such as smart-phones and tablet computers[16].These factors have allowed Android to become the world's most widely used smart-phone platform and the softwareof choice for technology companies who require a low-cost, customizable, lightweight operating system for high-tech devices without developing one from scratch.Android is used by majority of the mobile makers because of its popularity as it is user-friendly, open source, lightweight and one of the fastest mobile operating system[17]. The usage ratio of Android OS is quite higher compared to other operating systems available in market. Below chart from Granter shows that Android OS dominates in end user usage compared to other operating system.

Popularity of Android operating system is due to various advantages available in it, such as multitasking, ease of notification, easy access to thousands of applications via the Google android, android app market, phone options are diverse, can install a modified ROM, widget and many more. Most Android devices to date run OS version 4.1xJelly Beanthat was released on July 9, 2012, due to most lower-end devices still being released with it. We have chosen Jelly Bean(Android 4.1x) as it has gained much fame due to its stability and robustness and has covered around 50% of market.

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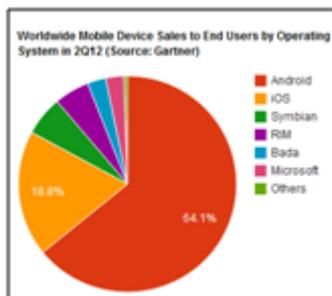
Figure 1 – worldwide Android usage statistics in 2012

Worldwide Smartphone Sales to End Users by Operating System in 2013 (Thousands of Units)

Operating System	2013 Units	2013 Market Share (%)
Android	758,719.9	78.4
iOS	150,785.9	15.6
Microsoft	30,842.9	3.2
BlackBerry	18,605.9	1.9
Other OS	8,821.2	0.9
Total	**967,775.8**	**100.0**

Source: Gartner (February 2014)[18]
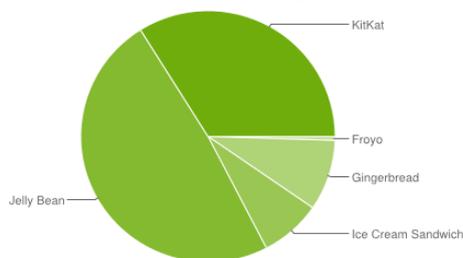
Any versions with less than 0.1% distribution are not shown.**Figure 2 - Usage share of the different versions. [22]**

Multilingual feature can be obtained using features like localization and internationalization. Localization is the process of taking a product and converting it for sale and use in another locale — where the term locale refers not only to regions that are distinguished by speaking different languages, but where anything that can influence the product or its marketing or sales process may be different[19]. Localization includes (but is certainly not limited to) the translation of all text associated with a product (such as on-line help, user manuals, dialogue boxes, etc), as well as changing currency, date notation, perhaps even porting the application to a different version of an operating system. Culture can also play a significant role in localization. Internationalization is the term used to refer to the process of designing an application or service in such a way as to prepare it for efficient localization. Empirical formulas are used from [20].

This mobile application provides support for threelanguagesGujarati, Hindi (which is spoken by almost 10 states in India and around 4 countries in the world) and English[21].It is completely menu driven and offers user-friendly screens organized to simplify and reduce effort to understand and easy to use as it supports touch screen features also.Usersare allowed to select the language of his region/interest and based on his requirements perform calculation, conversions, check abbreviations and constants. To perform calculations s/he should provide input values pertaining to that calculations, output of conversion of a unit into various units of that category is feasible after s/he enters type and value to be converted. Abbreviations and constants provide useful information to a user.
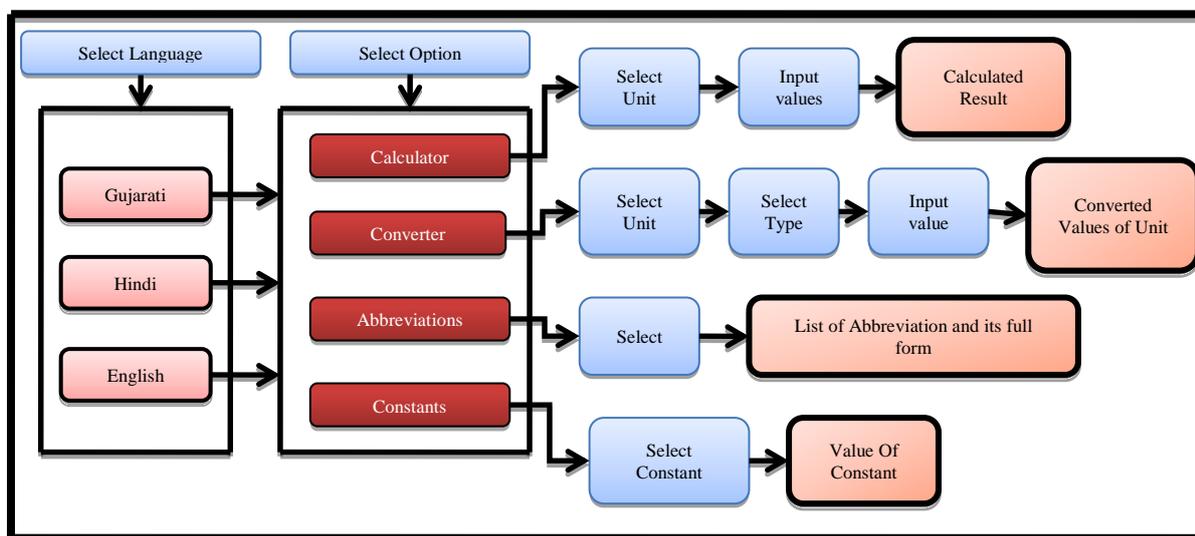
Figure 3 – Flow of Application

III.   RESULT AND DISCUSSION

The main objective of this application is to convert various meteorological weather parameters into different unit to ease further calculation and assist in calculating meteorological weather based parameters. This application is multilingual as wells as supports localization which helps user in calculating or converting certain units as per local standards. Android based convertor and calculator facilitates conversion like Temperature, Area, Radiation, Energy, Acceleration and alleviates required research

basedcalculation of weather parameter viz. radiation, dew point moisture level etc. on hand.

First screen of this application insist user to select his/her preferable language (Figure 4)

After selecting language application will automatically follow local standards for that regional language.Once user has selected his language a small menu follows which contains menu items like Conversion, Calculator, Abbreviations and Constants (Figure 5).

Figure 4– Language selection
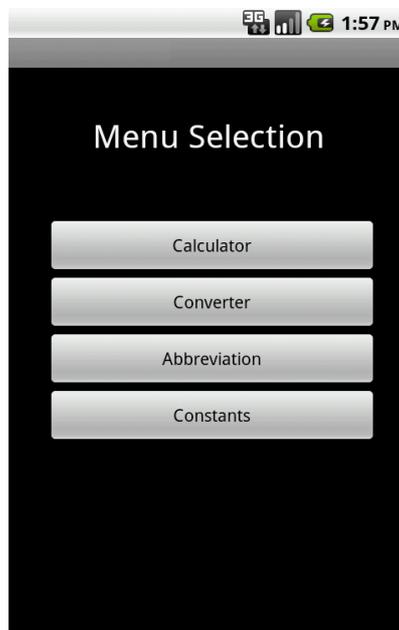
Figure 5 - Menu Options for type of operation to be performed

On entering convertor, user can select type of unit to be

Calculation screen allow use to select parameters from menu
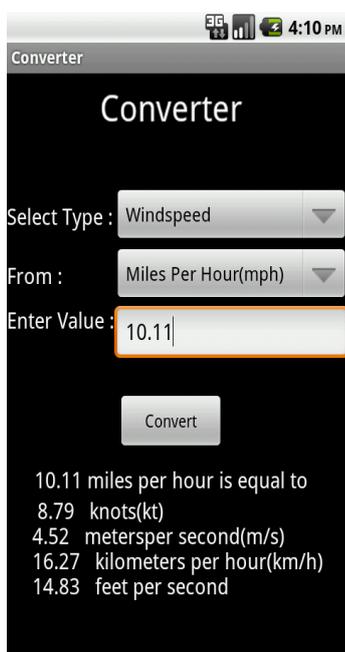
Figure 6.a
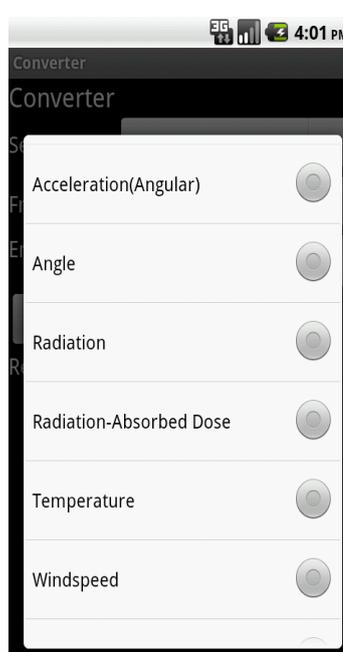
Figure 6.b

converted and enter value of conversion in response to this query application will provide all types of value conversions available for that category (Figure 6.a and Figure 6.b).

screen(Figure7.a,b,c) and according to selected unit and entered parameters, user can have result as calculated value of selected unit(Figure8.a,b,c)

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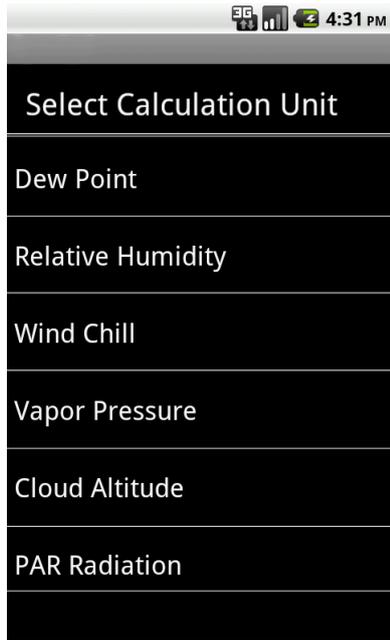
Figure 7.a – List of weather parameters for calculation (English)

Figure 7.b - List of weather parameters for calculation (Hindi)

Figure 7.c - List of weather parameters for calculation (Gujarati)
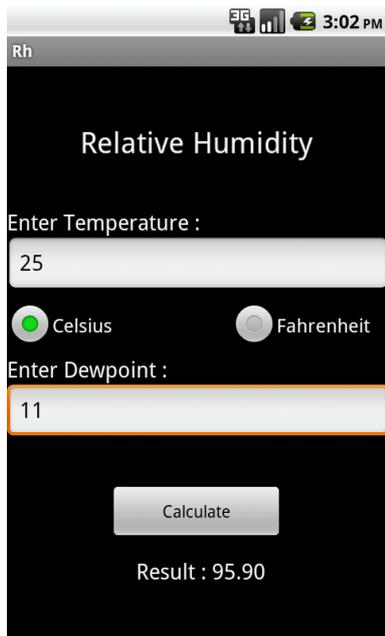
Figure 8.a – Calculation and Result (English)
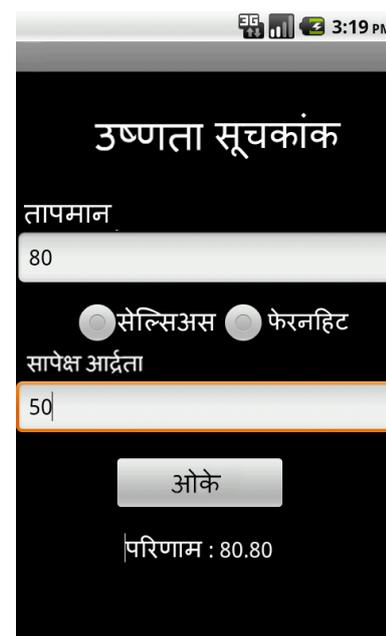
Figure 8.b - Calculation and Result (Hindi)

Figure 8.c – Calculation and Result (Gujarati)

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List of abbreviationsfor different weather terms are avail to user by Abbreviations option (Figure9).At last same way information related to constants different constants like

Universal Gas constant, Boltzmann's Constant, and Avogadro Number etc. will appear on mobile screen after selection of constant menu (Figure 10.a, b).
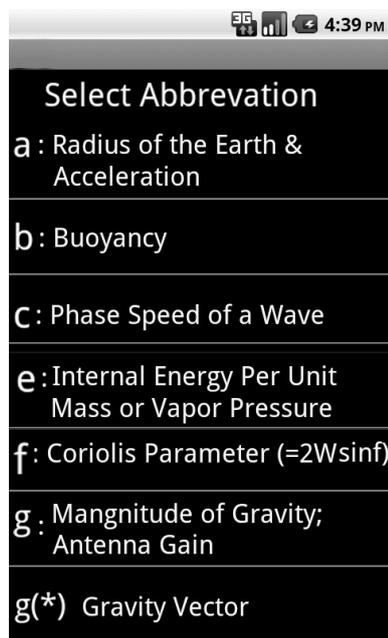
Figure 9 – List of Abbreviation
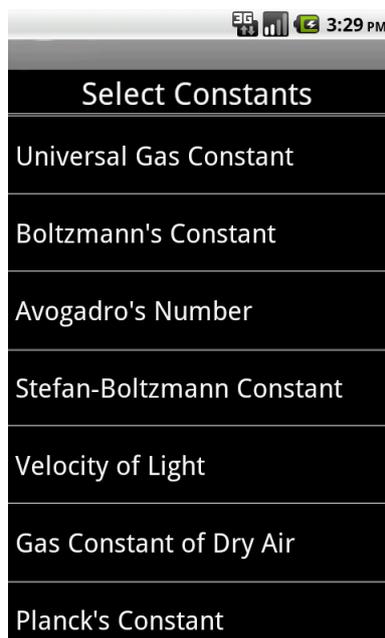
Figure 10.a – List of constant
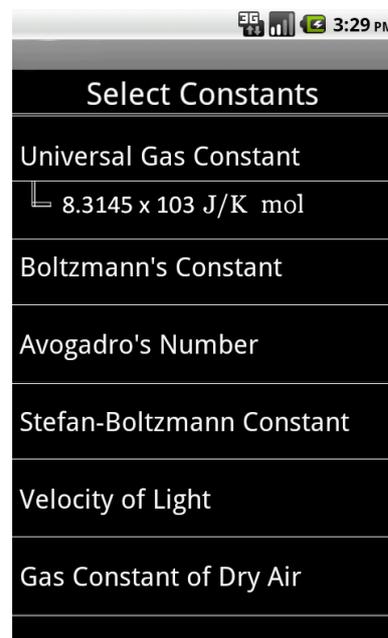
Figure 10.b – Value of constant selected

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