Android Application for Dementia and Alzheimer's Management -ADAM

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***Abstract*—Management of dementia puts a burden on those who are taking care of a care seeker that suffer from this chronic condition. Care takers frequently need to assist their care seekers with activities of daily living. Our application, runs on several Android based devices with GPS and communication capabilities. This allows for care takers to assist and help care seeker. Our aim is to develop an android application for people suffering from Dementia/Alzheimer's which will help them in performing their daily activities. India's population is undergoing a rapid transition. Soon, there will be a sharp increase in the number of older people in our population. Regions with more favorable health indicators seem to be ageing faster. India was home to more than 75 million people older than sixty years in 2001. This age group, which was 7.5% of the population, is expected to grow dramatically in the coming decades. Analysis of the census data shows marked variations in the rate of aging within India ranging from 10.5% in Kerala to 4% in Dadra and Nagar Haveli. We through our application ADAM (Application for Dementia and Alzheimer's Management) decided to address this issue by creating an easy intuitive environment to help care seekers in their day to day activities. A Care seeker in general faces the following problems. 1. Who Am I, 2. Who Is This, 3.Where Am I, 4. What To Do. These problems were identified as the major issues faced by care seeker. In addition to these problems we decided to include certain utilities like Calling an SOS contact or emergency contact. Each of these questions is addressed in individual modules of the same names.**

***Index Terms*—ADAM, dementia and alzheimer's management, android application.**

I. Introduction

A. Definition

Dementia is a syndrome, usually chronic, characterized by a progressive, global deterioration in intellect including memory, learning, orientation, language, comprehension and judgment due to disease of the brain. It mainly affects older people; only 2% of cases start before the age of 65 years. After this, the prevalence doubles with every five year increment in age. Dementia is one of the major causes of disability in late-life.

B. Literature Survey

Dementia is a syndrome usually chronic, characterized by a progressive, global deterioration in intellect including memory, learning, orientation, language, comprehension and judgment due to disease of the brain. It mainly affects older people; only 2% of cases start before the age of 65 years. After this, the prevalence doubles with every five year increment in age. Dementia is one of the major causes of disability in late-life.

Demographic aging is a global phenomenon. It has picked up momentum in low income countries of Asia, Latin America and Africa. India's population is undergoing a rapid demographic transition. Soon, there will be a sharp increase in the number of older people in our population.

India was home to more than 75 million people older than sixty years in 2001. This age group, which was 7.5% of the population, is expected to grow dramatically in the coming decades. Analysis of the census data shows marked variations in the rate of demographic aging within India ranging from 10.5% in Kerala to 4% in Dadra and Nagar Haveli. Other regions with elderly population above 8% include Himachal Pradesh (9%), Punjab (9%), Maharashtra (8.7%), Tamil Nadu (8.8%), Orissa (8.3%), Goa (8.3%), and Pondicherry (8.3%). The demand for services will soon be evident in such places and will make the task of meeting the needs for the older people more challenging and urgent. There is a growing realization that the care of older people with disabilities makes enormous demands on their care takers. Dementia remains a largely hidden problem in India, especially in those parts of India where poverty and illiteracy levels are high [1].

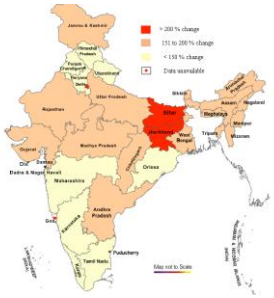

Fig. 1. Percentage change in dementia sufferers[1].

The projected number of people aged 65 and older with dementia for years 2011, 2016 and 2026 varies by state and region in India. Not only is there substantial variability by state in the projected numbers of people with dementia, but also between regions of the country. By 2026, more than 500,000 older people with dementia are expected to be living in and Maharashtra. In other states (Rajasthan, Gujarat, Bihar, West Bengal, Madhya Pradesh, Orissa, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) around 20,000 to 40,000 persons with dementia are expected within the next 26years.

Compared to 2006, Delhi, Bihar and Jharkhand are expected to experience 200% (or greater) increment in total number of dementia cases over the 26 year period. Other

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states (Jammu and Kashmir, Uttar Pradesh, Rajasthan, Madhya Pradesh, West Bengal, Assam, Chhattisgarh, Gujarat, Andhra Pradesh, Haryana, Uttaranchal, Maharashtra, Karnataka and Tamil Nadu) are estimated to experience 100% (or more) change in number of older people with dementia.

II. Design

A. Modules

The application will contain following main modules:

- Who am I?
- Who is This?
- What to do?
- Where Am I?
- Utilities

Who am I: This module deals with the aid that will help the patient recognize himself. This was identified as one of the major setbacks suffered by people suffering from dementia. The software would provide details of the care seeker incase he forgets about himself like Home, office, his name, DOB. This module aims at improving the independence of the care seeker.

Who is this: This module will help the patient recognize the people around himself.

- The care seeker tends to forget the people they have ever known.
- This module would help the care seeker to view the details of the person he meets.
- The user enters the name of the person whose information he needs and the profile of that person will be viewed from the stored database.
- The input may be in the form of speech in case it is difficult for the patient to type.

What to do: This module will work as a reminder to the patient to perform his required day to day activities.

- Assist in Day to Day Activities: What to do in order to check his mail, or where to have meal or go to bathroom. (Visual ,audio prompts)
- Activities depending on Mood: Video, Music as per preferences setup.
- Task Scheduling and notification
- Tasks priority (e.g. Medications ,Food)
- Adding of tasks (Remotely via SMS) and directly on the device.

where I am: This module deals with the location management. It will help the patient as well as the care taker to get the location of the patient. Various other facilities related to location management will be performed in this module.

- Location monitoring of the care seeker using GPS and cell triangulation
- Safe unsafe zones maintained (add,modify,delete)
- Remote Notifications to care Taker (SMS)
- Alert Modes –Red alert etc
- Location Feedback

Location tagged,

System gives hints to care seeker (clothing, friends to look out for etc).

Utilities:

- SOS-the care seeker might land into situations where he feels threatened
- Consoling him (making a call, suggesting people) or if he is really in a threatened state then the care giver must take immediate action.
- Responsibility Change

Care takers might be multiple: If one unavailable responsibility given to someone else

B. User Classes and Characteristics

There are two Main users of the system:

1) Care seeker (Patient): The care seeker is the patient itself who is suffering from Alzheimer's/Dementia characterized by:
   - Short-term memory impairment AND
   - Decline in mental inability in:
     a. Speech
     b. Memory
     c. Judgment
     d. Mood
2) Care taker: He is a sane person who is capable of his day to day activities and assisting the care seeker. He may be a friend, family member, relative, doctor or a nurse.

C. Design and Implementation Constraints:

Android system does not provide API's for calendar services on the Android version 2.3. An alternative calendar application that provides the desired services is to be chosen. An alternate is the private API which is not made public up to version 2.3 but is made public in version 4.0 onwards. The unavailability of 4.0 ROMs as of date on a test platform is the reason of not choosing the SDK 4.0.

The Location services to be used consist of fine and coarse locations. The fine location services are provides using GPS satellites to get location co-ordinates. This however needs an open to air view. A work around is coarse location service which provides location using cell triangulation using nearby cell-phone towers. The problem here is the accuracy of the co-ordinates which can be large in case cell phone towers are not available.

D. Assumptions and Dependencies

The system is assumed to be in an area having at least gps or network coverage. The system also is assumed to have working hardware components that are error free.

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