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Dog Health Management Trainer: An Effective eLearning System for Dog Owners and Practitioners

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SUMMARY

The use of Information Communication Technology is increasing rapidly to evolve the eLearning systems mainly in education as well as in agricultural field for providing easy accessibility, efficiency and quality of learning. E-learning has become a new paradigm to make available the knowledge in our society. Dog Health Management Trainer (DHMT) has been developed to disseminate the information on various aspects of dog health. The system has been evolved using latest web technologies including JSON, CSS3 and JavaScript. The system comprises of six different components viz., user interface, multimedia enabled interface, database, knowledge acquisition, domain expert and user administration. The user interface has been categorized into four modules i.e., breed database, general information, breeding & health care and vaccination and deworming. The system provides stepwise information to end users regarding various important aspects related to dog health. The end users explore the required information as they desired. The system was evaluated to find the usability in the IVRI Polyclinic visitors covering 100 dog owners. The results of the survey reveal that 87% dog owners have shown the keen interest to use and procure the system.

Keywords: eLearning, Dog, Breeds, Feeds, Health, Web browser.

1. INTRODUCTION

Information and Communication Technology (ICT) based eLearning system is the new paradigm of learning at anytime and anywhere. eLearning involves application of innovative ways to use ICT enabled applications in the field of agriculture domain. ICT has capability to contribute in achieving significant economic, social and environmental benefits (Gelb *et al.* 2008). The advancements of ICT enabled technologies let the researchers to develop the applications to provide accurate, timely, relevant information and services to the targeted users. Earlier the traditional methods of learning were having limited use in education. Now a days ICT offers advance ways of communication for delivery of contents in education and training to enable the learners in learning the convenient way as compared to traditional way of learning (Fritz *et al*. 2002).

Many eLearning systems have been evolved in various fields using ICT enabled tools and technologies (Dahiya *et al*. 2012a). The eLearning is most appropriate tool in educational institutes for disseminating the contents to the students and teachers (Dahiya *et al*. 2012b). It enhances the capability of education system as it is independent of time and location. It facilitates

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different types of user to create, add, update, and customize the contents (Hadjerrouit 2007). eLearning includes all types of information and communication channels *i.e.* Internet, Television, Community Radio, Mobile etc. The multimedia enabled technologies are helpful to develop the interactive web enabled system (Devraj and Chaturvedi 2001, 2003). The eLearning integrates two components (i) information contents and tutorial, (ii) domain expert (Hadjerrouit 2007). An effort was made to develop an expert system for selection of wheat varieties (Islam *et al*. 2011). Rapeseed Mustrad Germplasm database was developed using open source technologies (Kumar *et al*. 2013).

Dogs are often referred to as "Man's Best Friend". These are the only one amongst all the domesticated animals that are capable of performing multifarious roles. Man and dog have a relationship of interaction and mutual dependence. Dogs are also sometimes paralleled to the synonym for the word faithfulness. These animals serve their masters till the end without expecting anything in return. Dogs not only help to fulfill physical needs but may also fulfill socio-emotional as well as transpersonal needs. With the consequent rise in the nuclear family system, the rearing of pets in India has gained significant importance. In India, dogs are reared for various purposes, the most common being companionship, followed by security and safety. Farmers rear dogs to look after their home, livestock and fields while the urban people rear dogs for companionship and sometimes as a symbol of affluence. The dog owners are ready to take any type of risk to reduce the pain of their loving pet dog. The dog owners are in search of authentic information for the health care of their dogs.

Over 50% of dog owners are unknown that their dog may be at risk of heart failure which indicates the demanding need to boost the general awareness about congestive heart failure. In order to keep the dogs healthy, it is necessary for dog owners to understand the various aspects of information like breeds, common behavior, feeding, reproduction, health management and diseases that they suffers. It is important to educate the dog owners about detection of early symptoms of various diseases in advance so that they have sufficient time to take the preventive measures in avoiding the unrepairable risks (Pathak and Sharma 1992). The need for the awareness of the proper and systematic management to care their pets and their health care is the essential requirement (Sudarshan 2006). Further, most of the dog owners do not know the breeds of dog, intestinal parasites, transmission mechanism and risk factors for zoonotic infections and specific prophylactic measures (Katagiri and Oliveira-Sequeira 2008).

Easy access to information and improved communication is providing an efficient way of knowledge transfer among the practitioners and dog owners. However, it is observed that the rural populations still have difficulty in accessing desired information in order to make timely decisions due to non-availability of veterinary doctors and their advice in the crucial time. It is important to note that the availability and accessibility of information is demand driven rather than supply driven. The challenge is to document the information in the form of some package or tool which can be easily accessible and easy to use. The challenge in rural areas is not only to improve the communication technology but also to improve the contents relevant to the local needs. The conventional ways of information dissemination through radio, news papers, magazines, books, television are not meeting the expectations of the end users as most of these contents are old and not in practice. These facts are further documented as (i) the information needs are diversified and varied, (ii) lack of availability of interactive module that fail to cater the need of every types of clientele, and (iii) active involvement of the audience in providing the guidance by prioritization of perceived needs (Pathak and Sharma 1992).

The major sources of information for dog owners are available in Kennel Club Magazines, Breed clubs, Veterinarians, Internet and other relevant literature. Currently dog owners depend on bookish information and fail to get the

comprehensive and updated information as per their needs. The ICT enabled tools can help the dog owners and practitioners in providing the relevant and updated information by developing a comprehensive package or tool that follows the eLearning enabled technologies in a user friendly, attractive and interesting ways (Kumar *et al*. 2015). Dog owners need updated information that helps in making reasonable decisions concerning dog's health related issues (Alba and Hutchinson 1987). The information can be further supplemented by the recommendations given with high credibility or expertise through information sources (Duhan *et al*. 1997). Dog owners want to obtain more information about the caring of their pets (Leppanen *et al*. 2000). Changing attitudes of dog owners towards caring of their pets has increased the expectations and demands of veterinarians who are having the updated knowledge and practice of current diseases and treatments (Irwin and Traub 2006). Dog owners and breeders are facing the problem in obtaining the latest information about breeding and feeding practices (Hadge *et al*. 2009).

The detailed information on feeding, health care, breeding and management of various categories of dogs is not available at a single place. The lack of information about the dogs among the dog owners in rearing their pet dogs is not available in easy to use and accessible form. Therefore, their dogs succumb to various diseases which pose health hazards to humans as well since many of the canine diseases are zoonotic in nature. Thus, there is an urgent need to develop such informative system for Dog Health Management which provides the knowledge about the management and health care of dogs in easy to understand language. The system can be more useful, if it can provide the audio and visuals to make the multimedia enabled interactive and interesting system.

2. MATERIALS AND METHODS

2.1 Information Collection

Assessment and prioritization of the dog owners need for their desired information have been identified through semi structured interview schedule. The data of fifty breeds of dog has been collected. Apart from the primary data, secondary data from other sources such as call centers, veterinary hospitals and private veterinary practitioners have also been collected. The scientific information related to the prioritized need of the dog owner have been documented for various commonly occurring diseases of dogs and treatment. The collected information have been classified into following categories namely general information, breeds, registration process, behavioral pattern, kennel management, feed management, breeding and reproduction, health management, disease management, vaccination and its schedule, deworming and its schedule. This information has been validated by the available subject matter specialists or domain experts. Further, the information has been classified to various components in the form of modules. The information that is acquired by the users from the developed modules becomes knowledge when the users use it for their requirement. Images were also collected related to various activities of dogs and their diseases including foods. The voice has also been recorded for every aspect of various forms and reports.

2.2 Technology Used

a) ***HTML5:*** HTML5 is the web standard that defines HTML with new elements, attributes, and behaviour. This allows more diverse and powerful web based applications developement.

b) ***CSS/CSS3*****:** CSS3 is the latest version of the *Cascading Style Sheets* that is being used to define the standards and uniformity of the web pages. It helps in making design effects in images and visuals such as rounded corners, shadows, gradients, transitions or animations and various types of screen layouts like multi-columns, flexible box or grid.

c) ***Java Scripts:*** JavaScript is a client side scripting language and interpreted by the browser engine at the time of loading a web page.

d) ***JSON:*** JSON stands for **J**ava**S**cript **O**bject **N**otation. JSON helps in exchanging data or information in a platform compatible format. JSON is easy to use format and alternative to XML.

e) ***IndexedDB*****:** IndexedDB is a web standard for the storing the structured data. The data resides in the web browser and delivers the required contents using high performance searches. This is object oriented database which allows storing and retrieving objects that are indexed with a key.

2.3 System Architecture

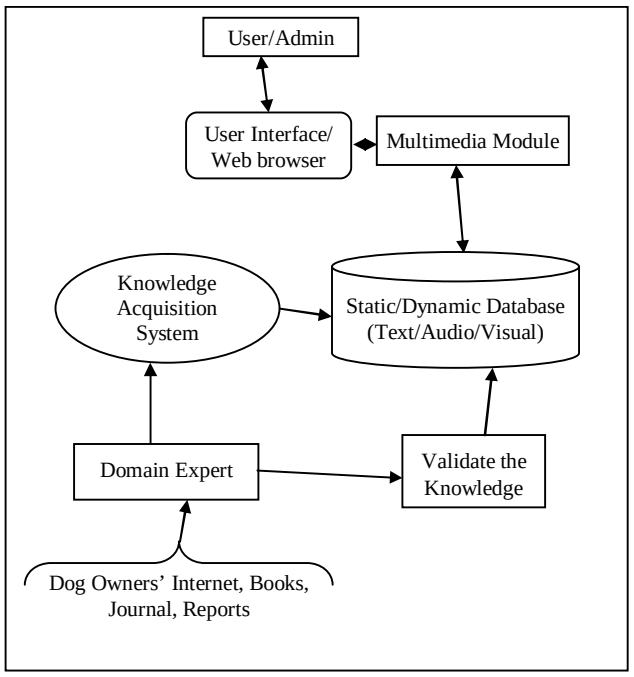

Fig. 1: Architecture of eLearning System for Dog Health Management System

The architecture of DHMT has been designed using n-tier based encompassing the standard web application architecture (Fig. 1). This system integrates different components and its corresponding interaction between various components. These components are briefly described as follows:

a) ***Data Base****:* A database using IndexedDB has been developed to store the collected information and processed knowledge. The developed database was used to develop the interactive eLearning modules.

b) ***Domain Expert:*** A subject matter specialists have validated the information and generated knowledge.

c) ***Knowledge Acquisition:*** after validating the data and the generated knowledge is stored in the knowledge base. This is updated by the administrator.

d) ***User Interface****:* The browser based platform has been developed to interact with the developed database. The interactive user interface has been developed to search and update particular or desired information by the specified category of user.

e) ***Multimedia Enabled Module****:* Content based retrieval (CBR) techniques have been used to retrieve multimedia enabled contents such as images, audio and visuals. The user can navigate and view the desired aspect by making few mouse clicks.

f) ***User/Admin****:* This module manages the various types of users of the system. The users have been categorized into three categories based on their access rights. These categories of users are veterinary practitioners, dog owners and subject matter specialists or domain experts.

3. RESULTS AND DISCUSSION

Dog Health Management Trainer (DHMT) was designed and developed to provide the stepwise information to various types of users. The database has been developed using IndexedDB. The texts, audio and visuals of the particular activity are synchronized using various controls. The multimedia enabled end user interface has been developed and converted into various eLearning modules. The workflow of the system is divided into three layers. The primary layer is login screen in which the user will provide their credentials to access the system (Fig. 2). After validating the users's credentials, the

available information and knowledge is accessible to the user. The system comprises into four modules namely general information, breeding & health care, breeds and vaccination & deworming (Fig. 3). In the last layer, the multimedia enabled contents can be viewed (Fig. 4). This system will also be useful to the kids to learn about the dogs and its habits. The developed modules are briefly described below:

Fig. 2: The Home Page of DHMT

Fig. 3: The Audio, Text and Photographs Synchronization

Fig. 4: The Four Modules Available in the System

a) ***General Information:*** In this module, the information starts with introduction, registration, kennel management, behavioral pattern, general and feeding management. The behavioral pattern of dogs are investigative, allelomimetic, epimeletic, et-epimeletic, conflict or agonistic, sexual, ingestive and contractual. General information of dogs are handling, routine outing, bathing/washing, nail clipping, hair dressing, docking, ear cropping, spaying and castration. The feeding management module provides the information related to feeding of pups, adult, pregnant bitches, old dogs and sick dogs.

b) ***Breeding and Health Care:*** Dog breeds, breeding and reproduction, health management including diseases have been mentioned. These are further described as follows:

(i) ***Breeding and Reproduction****:* The attributes under this are age of breeding/sexual maturity, frequency of heat in bitches, symptoms and duration of heat, choosing stud dogs, diagnosis of pregnancy and gestation period in dogs, signs of labour, whelping or birth of puppies, litter size, infertility in bitches.

(ii) ***Health Management:*** This specifies the details about anorexia, vomiting, diarrhea, snake bite and its emergency first aid, demodex mange, flea allergic dermatitis (FAD) and dental care.

(iii) ***Diseases:*** Major diseases have been considered that are rabies, canine distemper (CD), infectious canine hepatitis (ICH), canine viral gastro-enteritis and leptospirosis.

c) ***Breeds****:* The detailed information of fifty breeds of dogs is available in the system. This information is on various aspects namely (i) breed name, (ii) general, (iii) home track, (iv) body weight and heights, (v) head and face, (vi) mouth, (vii) ears, (viii) eyes, (ix) neck, (x) body, (xi) tail, (xii) fore quarters, (xiii) hind

quarters, (xiv) feet, and (xv) coat. The information for the selected breed is shown in Fig. 5.

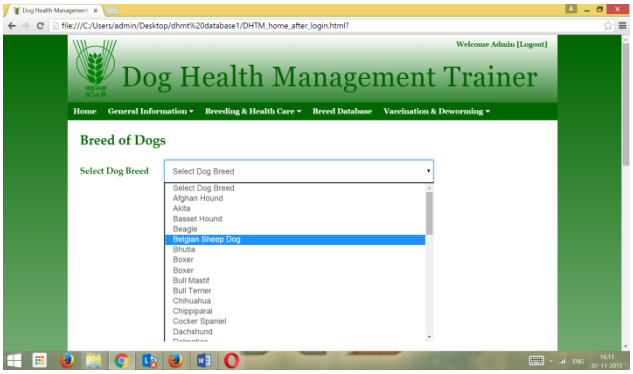

Fig. 5: Display for Selection of Dog Breed

d) ***Vaccination and Deworming:*** This module provides the information on vaccination and schedule, important precautions during vaccination, deworming and its schedule, effectiveness of various drugs and their combinations against different internal parasites.

4. PRACTICAL UTILITY OF THE SYSTEM

DHMT provides stepwise information to end users at their window regarding important aspects i.e. general management, feed and health care management. It also serves as an eLearning tool for the dog owners who are beginners and want to know the scientific methods of dog rearing. Simple and easy to understandable language helps the end users to learn the various practices need to rear the dogs. The illiterate dog owners can easily access and browse the information because it provides the audio along with visuals. It educates the dog owners about detection of early symptoms of various diseases and avail proper prophylactic and therapeutic care and services. Besides this, it also aware the dog owners with the generic dog diseases which are zoonotic in nature as they can also transmitted to humans.

The system was evaluated in the IVRI Polyclinic by interviewing 100 users. The perception parameters are completeness, utility, user friendly and interesting. The users perception was recorded on three important aspects i.e. design and user interface of the system, willingness to procure the system and cost of the system willing to pay. The survey results are summarized in Fig. 6. The remarks of the dog owners indicates that 81%, 57%, 67%, 60% very high, 16% 41%,27%,33% high and only 3%, 2%, 6%, 7% moderate, respectively. Regarding the purchase of the system, 87% dog owners shown the keen interest to procure the system but they wants to acquire on a moderate cost.

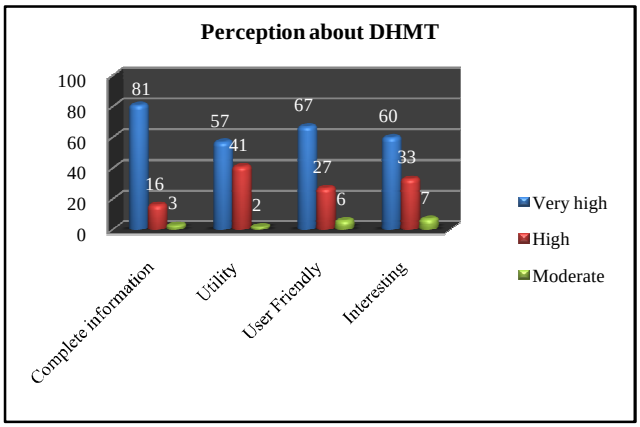

Fig. 6: Perceptions about DHMT System

The eLearning browser based system enables the users to learn the dog rearing and management in self-paced learning that reduces the number of steps and sessions required in traditional extension process. It facilitates end user as a single window access system to provide the information and knowledge about dog health management. Thus, there is no need to get the direct consultancy of professional experts.

5. CONCLUSION

Assessment and prioritization of information need for the dog owners have been identified through semi structured interview process. The secondary data have been collected from various available resources. The collected information have been documented and validated by the subject matter specialists. Dog Health Management Trainer (DHMT) was developed using latest web technologies using n-tier architecture to deliver the information and knowledge on dog health and breeds to end users.

The system contains the information about fifty breeds on various aspects. The system delivers the contents in multimedia enabled way as it contains audio, visuals and images. The rearing of dogs and its management has become easier as the system provides the importation about different aspects such as health, feeds, behaviour, vaccination and its schedule. It also acts as a teaching tool to the educators and helpful to the practitioners.

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REFERENCES

Alba, J.W and Hutchinson, J.W. (1987). Dimensions of consumer expertise. *J. Consumer Res.*, **13,** 411-454.

Dahiya, Shashi, Chaturvedi, K.K, Jaggi, Seema, Bharadwaj, Anshu, Varghese, Cini (2012a). A digital education initiative in agriculture. *J. Farm. Sys. Res. Dev.*, **18(2),** 175-179.

Dahiya, Shashi, Jaggi, Seema, Chaturvedi, K.K., Bhardwaj, Anshu, Goyal, R.C. and Varghese, Cini (2012b). An eLearning system for agricultural education. *Ind. Res. J. Ext. Edu.*, **12(3),** 132-135.

Devraj and Chaturvedi, K.K. (2003). Internet for technology transfer in agriculture. *Agric. Ext. Rev.*, March-April 2003, 3-6.

Devraj, Chaturvedi, K.K. and Singh, P.K. (2001). Multimedia: An emerging technology for agricultural extension. *Agric. Ext. Rev*., Sept-Oct 2001, 3-8.

Duhan, F.D., Johnson, S.D., Wilcox, J.B and Hareel, G.D. (1997). Influences on consumer use of word of mouth recommendation sources. *J. Acad. Market. Sci.*, **25(4),** 283-295.

Fritz, S.M., King, A.W., Moody, L.B, Schauer, J. and Rockwell, S.K. (2002). Analysis of distance education research. *Presented at the 29th National Agricultural Research Meetings (1992-2001)*.

Gelb, A., Maru, J., Brodgen, E., Dodsworth, R., Samii, V., Pesce (2008). Adoption of ICT enabled information systems for agricultural development and rural viability. ICT Adoption Workshop at the IAALD-AFITA-WCCA Conference 2008. http://iaald-afita-wcca2008.org/

Hadge, M.R., Prajakta, K., Saleha, N. and Raja, A.A, (2009). Socio economic status of dog keeper in Akola city of Vidarbha Region. *Ind. J. Anim. Res.*, **43(2),** 151-152.

Hadjerrouit, S. (2007). Applying a system development approach to translate educational requirements into e-Learning. Interdisciplinary Journal of Knowledge and Learning Objects, Vol. 3. Information and Communication Technologies'. *Instruct. Sci.*, **29,** 95-125.

Irwin, P. and Traub, R. (2006). Parasitic diseases of cats and dogs in the tropics. *Pers. Agric. Vet. Sci. Nutr. Natural Resour.*, **1**, 21.

Islam, S., Kundu, S., Shoran, S., Sabir, N., Sharma, K., Farooqi, S., Singh, R. Agarwal, H.O., Chaturvedi, K.K., Shrama, R.K. and Sharma, A.K. (2012). Selection of wheat (triticum aestivum) variety through expert system. *Ind. J. Agric. Sci.*, **82(1),** 39-43.

Katagiri, S., and Oliveira-Sequeira, T.C. (2008). Prevalence of dog intestinal parasites and risk perception ozoonotic infection by dog owners in São Paulo State, Brazil., *Zoonoses Public Health.*, **55(8-10),** 406-413.

Kumar, Mukesh, Tiwari, Rupasi, Dutt, Triveni, Singh, B.P., De, U.K., Saxena, A.C. and Singh Y. (2015). Designing an e-Learning system framework for dog health management trainer. In: *Proceedings of the 9th India Com; India Com-2015; IEEE Conference ID: 35071 2015 2nd International Conference on "Computing for Sustainable Global Development"*, 11th – 13th March, 2015; ISSN 0973-7529; ISBN 978-93-80544-14-4 pp 5.120-5.124.

Kumar, V., Singh, K.H., Chaturvedi, K.K. and Nanjundan, J. (2013). Design and implementation of web-based database of rapeseed-mustard germplasm using Linux - Apache - MySQL - PHP (LAMP) technology. *Afr. J. Agric. Res.*, **8(22),** 2733-2743.

Leppanen, M., Paloheimo, A. and Saloniemi, H. (2000). Attitudes of finnish dog-owners about programs to control canine genetic diseases. *Preventive Vet. Medi.*, **43(3),** 145-158.

Pathak, N.N. and Sharma, M.C. (1992). *A Hand Book on Dog Keeping*. I edition, S.P. Publishers, Noida, U.P., 107.

Sharma, M.C. and Pathak, N.N. (2008). *Breeds and Health Management of Dogs*. First edition. CBS publishers and distributors, Daryaganj, New Delhi, 1-295.

Sudarshan, M.K., Mahendra, B.J., Madhusudhana, S.N, Narayana, D.H.A., Rahman, A., Rao, N.S., Meslin, F.X., Lobo D., Ravikumar, K. and Gangaboraiah, (2006). An epidemiological study of animal bites in India: results of a WHO sponsored national multi-centric rabies survey. *J. Communicable Diseases*, **38(1)**, 32-39.