
IDENTIFICATION OF TREES USING QR CODE IN COLLEGE CAMPUS

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ABSTRACT

Trees are the foremost source for producing the oxygen in environment and ensure a healthy productive and sustainable environment. In our campus, we have number of trees with different species. Accurately identifying and managing a large number of trees can be a challenging task. So we have generated QR code for each distinct tree and mapped them with its description like tree id, botanical name, english name, tamil name, family and its medicinal uses. Students and visitor can get details about the tree by scanning the QR code with their smartphone camera which has QR code reader apps. The research findings explores the benefits, challenges, and potential applications of QR codes for tree identification, inventory maintenance, and educational outreach. The findings highlight the potential of QR codes as a valuable tool for enhancing tree management practices and fostering a deeper understanding and appreciation of campus green spaces.

Keywords - QR code, Trees, open source technology, database, environmental education.

1. Introduction

The Biodiversity is an important concept to understand the variation at genome or gene level, species level and ecosystem level. India is one of the most densely populated regions of the world and harbours two of the 38 global biodiversity hotspots; the Eastern Himalayas and the Western Ghats. These regions harbour some of the important gene pools of medicinal plants, wild varieties of cultivable crops and other species of economic importance as well as innumerable endemic and RET plant species. India is also rich in its own flora with several species of endemic plants. Biodiversity is the store house of species richness and acts as a cushion against potentially dangerous environmental changes and economic reforms. Plant genetic resources are the major biological basis of the world food security. In all means, they support the livelihoods of every life on planet earth. Hence, conservation of such a buffer is considered fundamental and provided priority in all sectors of global development. Systematic enumeration of plant would be a strategy for imparting knowledge on the plant diversity.

The campus of V.V.Vanniaperumal College is blessed with incredible plant diversity. Trees play an important ecological role within the environment, as well as support improved public health and provide aesthetic benefits to the surroundings (Nowak *et al.* 2008; McPherson *et al.*, 2003). The benefits of trees can vary widely depending on the context in which they are planted (Hale *et al.* 2015). For example, planting trees strategically near buildings can maximize the impact of trees' cooling effect and subsequently reduce air conditioning costs. Planting large species of trees and maintaining them, so they reach maturity results in more benefits than the same number of trees of a smaller species (Sydnoret *et al.* 2011).

In addition to providing clear benefits to humans, trees provide essential habitat and food sources for wildlife in a landscape increasingly fragmented by urban development. Even small urban parks

provide significant habitat for local and migrating birds (Rega et al. 2015). Trees on streets and in parks are now recognized as more than just pleasant features with associated maintenance costs; they are the backbone of urban forests and ecosystems. Trees can improve the mental health of communities and relieve stress. Exposure to nature and restorative environments increases sustained attentional capacity (Berto 2005). Easy access to green outdoor environments from workplaces has been found to significantly reduce worker stress (Lottrup 2013). Overall, academic institutions and hospitals have found that natural settings and trees result in measurably positive impacts on students and patients (Wolf et al. 2014). The benefits of trees are not only well recognized by the academic community, but by municipalities and institutions around the country and the world (Seamans 2013). The benefits of trees can vary widely depending on the context in which they are planted (Hale et al. 2015). Planting large species of trees and maintaining them so they reach maturity results in more benefits than the same number of trees of a smaller species (Sydnor et al. 2011, Harkey, 2015). Simply planting trees without consideration for their species, location, and maintenance will not result in all of their wished-for benefits. It is essential to plan where trees are planted and to plan their ongoing maintenance in order to maximize future benefits and to ensure long-term tree survival and growth.

Trees play a vital role in the environment, society, and ecosystem health. Their importance spans across various aspects, including ecological, social, economic, and even psychological benefits. Trees play an important role in climate change, being able to pull carbon dioxide out of the air and sink it into the ground.

2. Methodology

The traditional methods of tree identification often require extensive knowledge of botanical characteristics and can be time-consuming. By leveraging the ubiquity of smartphones and QR code technology, we propose a convenient and efficient solution that allows users to identify trees in real-time. This paper outlines the design, implementation, and evaluation of a mobile application that utilizes QR codes to provide users with instant access to tree information, including species, common names, and other relevant details. The proposed system offers a user-friendly interface, seamless integration of QR code scanning, and a comprehensive database of trees.

3. Result and Discussion

The identification of trees using QR codes serves various objectives, benefiting both the environment and the people interacting with trees. Here are some key objectives of implementing such a system:

Tree Education and Awareness: QR codes attached to trees can provide valuable information about each tree's species, characteristics, ecological importance, and benefits. This enhances public awareness about the diversity of trees and their significance in the ecosystem.

Environmental Conservation: By providing detailed information about trees, people can better understand the importance of preserving and protecting trees and their habitats. This promotes environmental conservation efforts and encourages responsible behavior towards nature.

Botanical Research and Data Collection: Researchers and botanists can use the collected data from QR codes to study tree populations, species distribution, growth patterns, and other relevant botanical research. This data can contribute to a deeper understanding of local ecosystems.

Planning and Landscaping: Identification of trees using QR codes can assist planners and landscape designers in making informed decisions about tree placement, maintenance, and future development. It helps create greener and more sustainable environments.

Accessibility and Interactivity: QR codes provide an interactive way for people to access information about trees using their smartphones. This convenient method allows individuals of all ages to learn about trees with ease.

Identifying a tree using the Open Source Software like PHP alone is a challenging task, as PHP is primarily a server-side scripting language and not suitable for complex image recognition tasks. However, you can integrate PHP with other technologies to achieve tree identification.

Data Collection

Different tree species images were gathered as a dataset. These dataset is well-labeled, with each image associated with the corresponding tree species. The tree description at our College campus is listed as shown in the Table 1. Images of few trees are shown in Figure 1.

Table-1: Trees at our College Campus

S. No	Scientific name	Family	Common name	Local name	Habit	Uses
1.	<i>Aegle marmelos</i> (L) Correa	Rutaceae	Indian bael	Vilvam	Tree	Fever, respiratory problems, tuberculosis and gastric ulcer
2.	<i>Azadirachta indica</i> A Juss	Meliaceae	Neem tree	Vappamaram	Tree	cure poison, cancer, malaria, fungal disease, cardiac care and chicken pox
3.	<i>Bauhinia racemosa</i> Lam	Fabaceae	Yellow bauhinia	Thiruvachi	Tree	Skin problems, cure wounds, sore throat, swelling of liver.
4.	<i>Carica papaya</i> {L}	Caricaceae	Paw paw	Papaya tree	Tree	cure diseases, gastrointestinal tract disorder, cure colorectal cancers, cure low sugar level, stomach intestinal problems.
5.	<i>Cocos nucifera</i> {L}	Arecaceae	Coconut tree	Thennaimaram	Tree	treatment of urinary infection, moisturize skin and hair, build strong bones, skin aging problems
6.	<i>Ficus benghalensis</i> (L)	Moraceae	Indian banyan	Aalamaram	Tree	cures ear problems, nasal bleeding, treatment of gonorrhoea, tooth problems
7.	<i>Ficus religiosa</i> {L} Forssk	Moraceae	Peepal tree	Arasamaram	Tree	change for conceiving a child, cure asthma, good for oral health, cure jaundice, treat breast problems
8.	<i>Manilkara zapota</i> {L.} P.Royen	Sapotaceae	Chiko tree	Sapota	Tree	immunity power, prevent colon cancer, stopping the loss of blood,

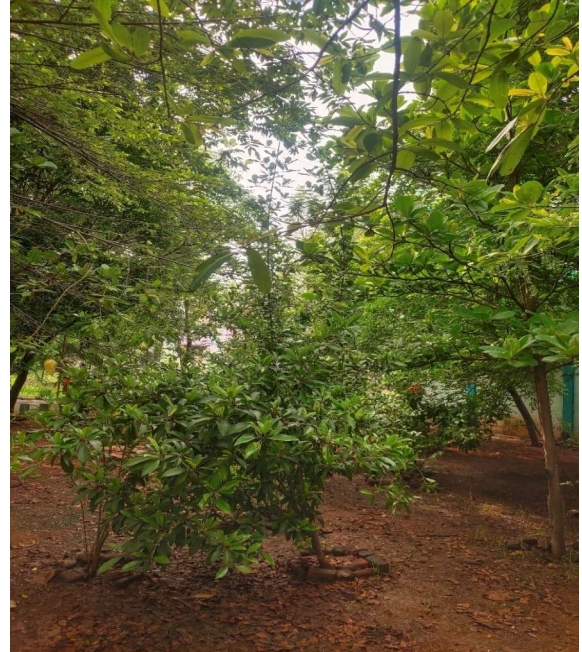
						development of the foetus during pregnancy
9	<i>Morindacitrifolia Roxb</i>	Rubiaceae	Indian mulberry	Manjanathi	Tree	reduce heat of our body, cure external wounds, treat throat ulcer, keep their blood level normal
10.	<i>Musa paradisiaca{L} Colla</i>	Musaceae	Desert plantain	Valaimaram	Large herb	proper functioning of heart, treat dysentery, bronchitis, cure fever and leprosy.
11.	<i>Murrayakoenigii {L} Sprenge</i>	Rutaceae	Curry tree	Karuveppilai	Tree	treat constipation, colic and diarrhea, improve appetite and digestion, weight loss.
12.	<i>Moringaoleifera Lam</i>	Moringaceae	Drumstick tree	Murunga	Tree	protection of skin and hair, treatment of oedema, protect the liver, treating mood disorders like depression, anxiety and fatigue.
13.	<i>Psidiumguajava {L}</i>	Myrtaceae	Guava tree	Guava tree	Tree	Treat low blood sugar, reduce stomach pains, reduce menstrual cramps, knee pain, cancer disease.
14.	<i>Sesbaniagrandidiflora {L.}Poiret</i>	Fabaceae	Vegetable hummingbird	Agathi	Tree	Repair for damaged cells of pancreas, control blood sugar, hinder growth of tumor cells.

Figure 1

Pictures of some trees with its common name



Indian almond Tree



Chiko tree



Peepal tree



Indian banyan tree



Drum stick tree



Guava tree

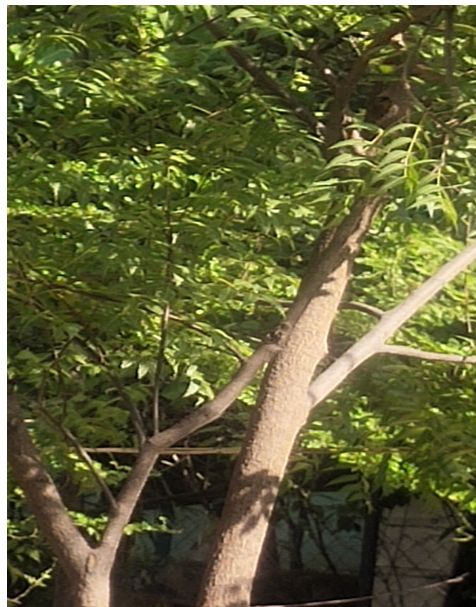
QR Code Generation and Database creation

Open Source Software like PHP was used to generate QR code for each tree species. Using MySQL database tool, Tree database is created with the necessary fields like tree id, botanical name, english name, tamil name, family and its medicinal uses.

The generated QR code is mapped to a distinct tree species that is shown in the following Table-2. This depicts the QR Code generated for the Neem Tree and its descriptions.

Table-2: QR Code generated for the Neem Tree

QR CODE



Neem Tree

Scientific name:

Azadirachta indica A Juss

Family name: Meliaceae

Common name: Neem tree

Local name: Vappamaram

Medicinal Uses: cures poison, cancer, malaria, fungal disease, cardiac care and chicken pox

CONCLUSION

QR codes can provide quick access to information about specific trees, helping people learn more about the local ecosystem and contribute to data collection efforts. Each QR code will be used as a tag for tagging trees and can be scanned by anyone to learn more about the trees. This system

allows tree management departments to easily collect tree data and store it in a cloud database, which can then be retrieved to serve good management and raise community awareness of the benefit of tree cover among citizens.

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