# Orphan Adoption Management System using Machine Learning Approach

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**Abstract:** According to UNICEF, the latest estimate states that there are about 2.7 million children in orphanages. Orphanage is a residence for people who are without parental support or any moral support from anyone. Such orphans require help from people who are in a good financial state to donate them. Generally, in orphanage records are usually maintained for future reference, retrieval, and easy management. The objective of this paper is to help the orphans from different orphanages to get help from the donors who wish to donate them by using our web application. The proposed system helps the staff in reducing manual paper work and enhances tidiness in record keeping since the existing one uses manual keeping, i.e., the use of files and papers. The system allows the orphanage owner to add and modify the orphan records. The system provides suggestions for assignment of these orphans to the caretakers/donors by using SVM (Support Vector Machine) algorithm. Donor can select the orphan and request for adoption from the orphanage owner. The Orphanage owner can accept or reject help from the donor. The proposed system is aimed to facilitate donors with the details of an orphan and providing fund specifically to that orphan.

**Index Terms:** SVM algorithm, Orphan, Record management, Machine Learning.

## 1. Introduction

Orphanage is a residence for many orphans who are separated from their biological parents under critical situations. If a child has no parents - because the parents lost their life or lost custody and child is considered an orphan. Though some work has been done and highlighted there is a need for helping system. Henceforth, the research proposal aims at presenting a study in this aspect. As the pandemic diseases began leading to the death of millions of parents worldwide, it left an increasing number of children without one or more parents [1].

Our society consists of people who are less fortunate, for example, the needy, homeless or even orphans. Individuals and organizations in one way or another intervene by giving support, which may be in the form of shelter, food, medical attention or education [2]. All over the world, there are organizations that have put in place facilities to help the society as a show of gratitude. Orphan management aims focus on helping the needy ones and promoting good cause for them. Several wide angles have been focused on this aspect which has highlighted on the significance of the proposed topic of investigation.

The latest estimation from UNICEF in 2017, stated that there are at least 2.7 million children in orphanages and caring institutions. Hence, the public need to create more facilities to help them grow spiritually, mentally and physically

[3]. Children in orphanage are often exposed to abuse, exploitation, lack of love and affection, and care of parents. Many orphans are brought up under institutional care, where support for each individual is impossible. All these factors can affect orphan mental health and their concentration in studies. Several other attributes like school management, hospital management, online tracking system etc have been widely addressed [4].

Orphanage information system includes the data such as records of children, guardians or caretakers, donors, sponsors, adoptive parents, adoption, activities, schedules of events. Some events such as organizing donations and marathons, details of nearby volunteers and well-wishers are also kept in records. Each child is assigned a caretaker or guardian, who is solely responsible for providing basic resources, nurturing and support, and development for the well-being of children. There are parents who wish to adopt children under government policies and regulations of adoption and the Child adoption Acts. They offer permanent home to children after adoption. COVID-19 has had a huge impact on the social, cultural, economic, education, tourism, trade and other sectors which focus on health and humanitarian issues which were most predominantly highlighted [5].

Apart from internal funding, these orphanages also receive support from volunteers, donors, sponsors and other well-wishers. Some web oriented project on Orphanage Management System was introduced to keep track of record of all the orphans for easy accessibility of information. Sponsors can fund a specific child or several children and projects within the orphanage such as classroom construction. Donors provide funding generally to all children. Institutions, through their employees and students and churches also pay visits to children after booking a request. They take part in playing with children, giving advises and training. Some people also volunteer to help children due to their own willingness.

In this section we have discussed on the view of orphan management process, some existing systems, impact on orphan management in different sectors etc. Similar other work has been outlined in section 2. The basic ideology on orphan management system is presented in section 3. The proposed system with result illustration is presented in section 4 and subsections. The conclusion and future work is presented in section 5.

## 2. Literature Review

This section of the paper highlights on some of the standalone system that was designed for an orphanage home centre to maintain the orphan registration. Structure System Analysis and Design (SSAD) is used as the main methodology of the system. Using the database, they gathered the logical-related files which can be integrated and organized so as to provide the single comprehensive file system [6]. In which they reduce the redundancy of stored data and security restrictions are applied, inconsistency of data is also avoided here. The features provided here are faster data processing and accessing, backup and recovery, data integrity. This system uses PHP and CSS for front-end development and for back-end done using MySQL.

An system for orphans to get any kind of help from volunteers/donors who are willing to donate for orphanages. User can register and donate food, money, clothes to the orphanages. Admin plays the major role of collecting donated items from the donor and distributes to all the orphanages registered in the website. Additionally, adoption process is also specified. Parents can search for the child to adopt, after being evaluated using eligibility checker of adoption. This system provides faster adoption process and time saving system [7].

Classification is considered as the most required task in text categorization, image classification, future prediction, etc. Orphan system mainly focus on four different data set such as diabetes data, heart disease data and satellite information data each with different features, classes, number of training data and different number of testing data [8]. Model selection is a major factor for the classification algorithm. Appropriate parameters selection will result in accurate classification. SVM is applied for all kinds of dataset, and the analysis based on each dataset is done. Accuracy of testing and training data obtained is clearly stated. Using different kernel functions, comparative results are produced through this work.

Charity Connecting System explained all the functional requirements and non-functional requirements. For front-end development, JavaScript was formalized in the ECMA Script language standard and is primarily used as part of a web browser [9]. ODBC is used to connect with backend (MySQL database server) with the system. Adoption eligibility is checked for parents who are willing to adopt, according to the government laws. Admin has the responsibility of collecting funds generally from all donors and distribute it according to the need of registered orphanages. This paper summarizes that the system is efficient in connecting orphan to the public.

Information management systems managing orphan databases in the orphanage [10]. Such systems also summarizes about the existing systems like Willigen's foster care web application. The Yii framework from the PHP web framework is used in this system. The system provides facilities like the adoption request form for faster adoption process online. The RAD model is used for collecting user requirements at any stage of the progress as it can deliver quicker results. Fund transaction through online is also implemented in this system.

## 3. Orphan Management System

Generally, information is stored manually in the form of papers resulting in a large set of files. It involves the use of paperwork to record orphanage information, then papers are filed and kept in a safe or cabinet. It is a book keeping system in which information is maintained by hand without using a computer system.

To develop a web application that helps the donors to provide help for a particular child/orphan, in which selecting an orphan is done by giving donor's preferences of age and gender, and classifying dataset using Support Vector Machine (SVM) algorithm. A simple website application which helps the donors to search for a particular child and donate for their expenses. In this system, the data of donors/volunteers, orphanages are stored and retrieved. A User who did not register will not be able to view any data of the system. The home page of the website shows different types of login roles, such as orphan login, donor login and admin login. Each login page has a registration form along with it for ease. The data could be integrated using some of the affinity mapping techniques for ease of data access [11].

Once the orphanage owner registers and logins the website, he/she can add, delete, view the data of orphans he/she has enrolled in the website. The owner can add orphan details like name, age, educational qualification, estimated amount required and reason for it. Orphanage owner can post the events conducted in their orphanage to make people get more motivated towards donating. In the same way, the donor also has to register for the first time and then login each time they enter the website. After a successful login, the donor can view the details of all the orphans and the help they need irrespective of the orphanage details. Donor can search for any category of orphan and then donate for their expenses. Once the orphan is selected, the other donors will not be able to select the same orphan.

## 4. Proposed Research Methodology

The architecture diagram (Fig.1) gives the basic processes done by the system. The dataset is created and stored in the database servers for easy retrieval and access. The selection constraints provide options for the Donor to give their preference of orphan based on gender. Gender can be classified as either male or female and provide result according to user input. Then, age can be classified into below 10 and above 10, within the classified results of gender.
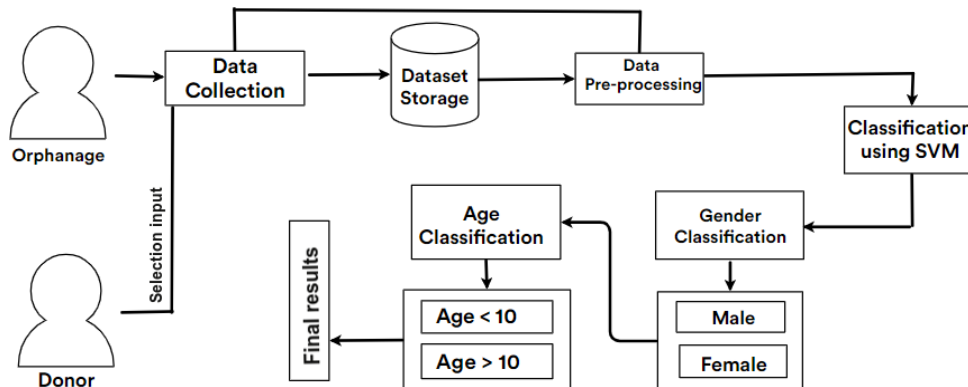


Fig. 1. Proposed architecture diagram

Finally, the donor selects any orphan from the classified results that are displayed, following by which a request is sent to the orphanage owner for donating that orphan. For gathering user requirements from the orphanages and children homes, used the following techniques: Firstly, one-to-one interviews were conducted with the orphanage staffs for getting information about information management. Secondly, observed how the data is stored and maintained and wrote down the challenges they faced while using the system. Also, we have prepared several questionnaires to help collect data from orphanages in order to determine the disadvantages of the existing system, if they may prefer trying a new system. As the paper talks on preliminary level attempts to validate our proposal, we aim at presenting a comparative study using recent techniques including machine learning, data analytics etc [12].

Table 1. Sample dataset

| Student Name | Age | DOB | Gender | Education | Minimum Cost |
|---|---|---|---|---|---|
| Ram | 15 | 22-05-2005 | Male | 10th | 15000 |
| Venmathi | 12 | 18-02-2009 | Female | 12th | 12000 |
| Jeevitha | 21 | 1-1-2000 | Female | Graduate | 5000 |
| Hari | 8 | 18-08-2013 | Male | Graduate | 17000 |
| Ranjitha | 10 | 28-04-2011 | Female | 12th | 13500 |
| Deepak | 6 | 14-05-2005 | Male | Graduate | 9000 |
| Chitra | 17 | 18-05-2015 | Female | Graduate | 6000 |
| Mani | 9 | 08-11-2004 | Male | Graduate | 18000 |
| Lokesh | 11 | 21-09-2012 | Male | 12th | 10000 |
| Bilal | 8 | 22-05-2010 | Male | Graduate | 15000 |

In this system, the Orphanage owner admits the details of each orphan that are to be displayed to the donor. A sample dataset is provided for reference is presented in Table 1. The input is collected from the donor and given as input to the SVM classifier [13]. The classifier converts the dataset into the real-time vector and then classifies data as positive and negative based on the vector. The SVM classifier constructs a hyper-plane which divides the dataset in the N-dimensional space where the data points are plot . The algorithm for SVM classification is given in Fig.2.
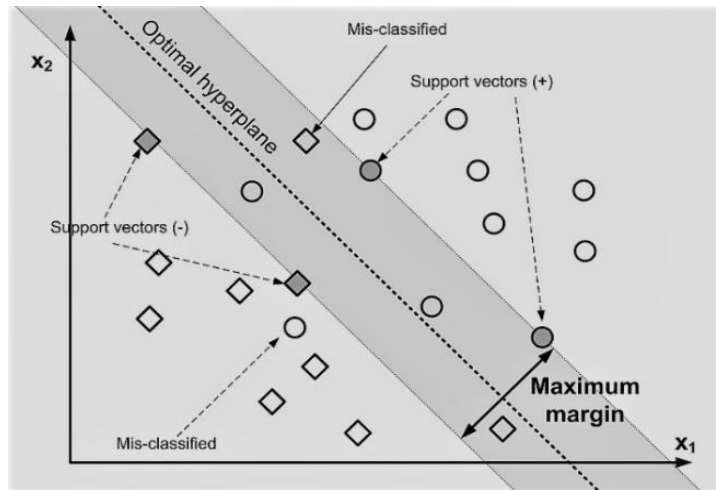


Fig. 2. SVM Classification algorithm

### 4.1. Gender-based Classification

The Donor logins the website and provides the details of his/her interest of an orphan. Table 2 presented below shows the classification output for searching female orphan.

Table 2. Gender based classification results

| Student Name | Age | DOB | Gender | Education | Minimum Cost |
|---|---|---|---|---|---|
| Venmathi | 12 | 18-02-2009 | Female | 12th | 12000 |
| Jeevitha | 21 | 1-1-2000 | Female | Graduate | 5000 |
| Ranjitha | 10 | 28-04-2011 | Female | 12th | 13500 |
| Chitra | 17 | 18-05-2015 | Female | Graduate | 6000 |

### 4.2. Age-based Classification

The Donor also specifies the preference of age as below ten years of age or above. Table 3 which shows the classification of orphan from the output of classification result based on age is between 10 to 15 and gender = Male.

Table 3. Age based classification results

| Student Name | Age | DOB | Gender | Education | Minimum Cost |
|---|---|---|---|---|---|
| Ram | 15 | 22-05-2005 | Male | 10th | 15000 |
| Bilal | 8 | 22-05-2010 | Male | Graduate | 15000 |

After selecting an orphan, the donor is able to request the orphanage for donating that child. The Orphanage owner accepts or rejects the help provided from any donor as per the requirement of orphan [14]. The accuracy is determined by comparing expected outcome with the actual outcome from the proposed system [15]. The percentage of accuracy calculated by using below formula is 95%.

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \qquad (1)$$

where

TP – True positive
TN – True Negative
FP – False Positive
FN – False Negative

Location detail of donor who is accessing the system is also fetched using the geo-location API. It derives the latitude and longitude values for mapping the current address online [16]. This feature is used to search for orphans nearby the donor's location.

## 5. Conclusion and Future Work

Machine learning helps in better classification and predictive techniques. SVM is one of the most appropriate supervised learning algorithms that classifies accurately. Its user interface makes it easier to access all the information without moving from one page to another unnecessarily. Therefore, the user doesn't have more hassle in accessing the content, creating, updating and retrieving records. Understanding the orphan needs and their struggles in daily life is very essential for everyone. A well-educated orphan will be able to develop their career in a better way [11]. The classified result looks accurate, and so does the application.

We have classified dataset using SVM machine learning algorithm by now. In future, we will implement classifications with other algorithms like Random forest, Naïve bayes classifiers to find the most accurate result. As the originality of orphanage is questioned each time, we will implement secured authorization techniques to ensure that the orphanage is authorized. The Orphanage owner will be able to register only if the admin verifies the license certificate of the respective orphanage and accepts the registration. The future work aims at presenting an improved management analysis system by comparing several technologies for efficient data handling, easy accessibility and others.

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