



# **Work Placement Classification of Students using C4.5 algorithm**

## **User Manual**

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**Version 1.0**

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## Table of Contents

<b>1. Introduction .....</b>	<b>3</b>
<b>2. Overview .....</b>	<b>4</b>
<b>3. Getting Started .....</b>	<b>5</b>
3.1 Set-up Considerations .....	5
3.2 User Access Considerations .....	5
3.3 Accessing the System .....	5
3.4 System Organization & Navigation .....	7
3.5 Exiting the System .....	9
<b>4. Using the System .....</b>	<b>10</b>
4.1 Importing Training Data & Generating Decision Tree .....	10
4.2 Importing Student Data .....	11
4.3 Classifying Work Placements .....	12
<b>5. Troubleshooting .....</b>	<b>14</b>
5.1 Special Considerations .....	14

# 1. Introduction

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Work Placement is a web application that classifies a student's possible type of work suited for them using their college grades. The application provides graphical representation of decision tree based on the training data and then classifies a student work placement based on the generated decision tree. This user manual is intended to provide step-by-step procedures in using the system as well as some troubleshooting for admin users.

## 2. Overview

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Work Placement is a web application that classifies a student's possible type of work suited for them using their college grades. The application provides graphical representation of decision tree based on the training data. It has graphical user interface (GUI) for both admin and client.

The system has 3 steps in using: importing data, generating decision tree, and then classifying students.

1. Importing Data

There are two types of data that must be imported into the system: the training dataset and the student data. The training dataset contains sample grades and corresponding class. The student data contains their actual grades that will be needed in classifying work placement.

2. Generating Decision Tree

A training data will be used to generate decision tree. Decision tree will be needed to classify student work placement.

3. Classify Work Placements

Student data will be used in classifying work placements based on their grades and the generated decision tree.

## 3. Getting Started

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### 3.1 Set-up Considerations

Work Placement uses 3<sup>rd</sup> Party applications such as Anaconda 3 (Python 3.7). To fully access the system, the following should be installed on your computer:

1. Python 3.7.1 (Anaconda 3 or newer version).
2. Apache
3. PHP 7.2.4
4. MySQL
5. Sklearn (Scikit-learn)

To install Sklearn, open the Anaconda Prompt then run the command:

```
pip install scikit-learn
```

6. Graphviz

To install Graphviz, open the Anaconda Prompt then run the command:

```
conda install python-graphviz
```

7. Pydot

To install Pydot, open the Anaconda Prompt then run the command:

```
pip install pydot
```

8. Google Chrome Browser

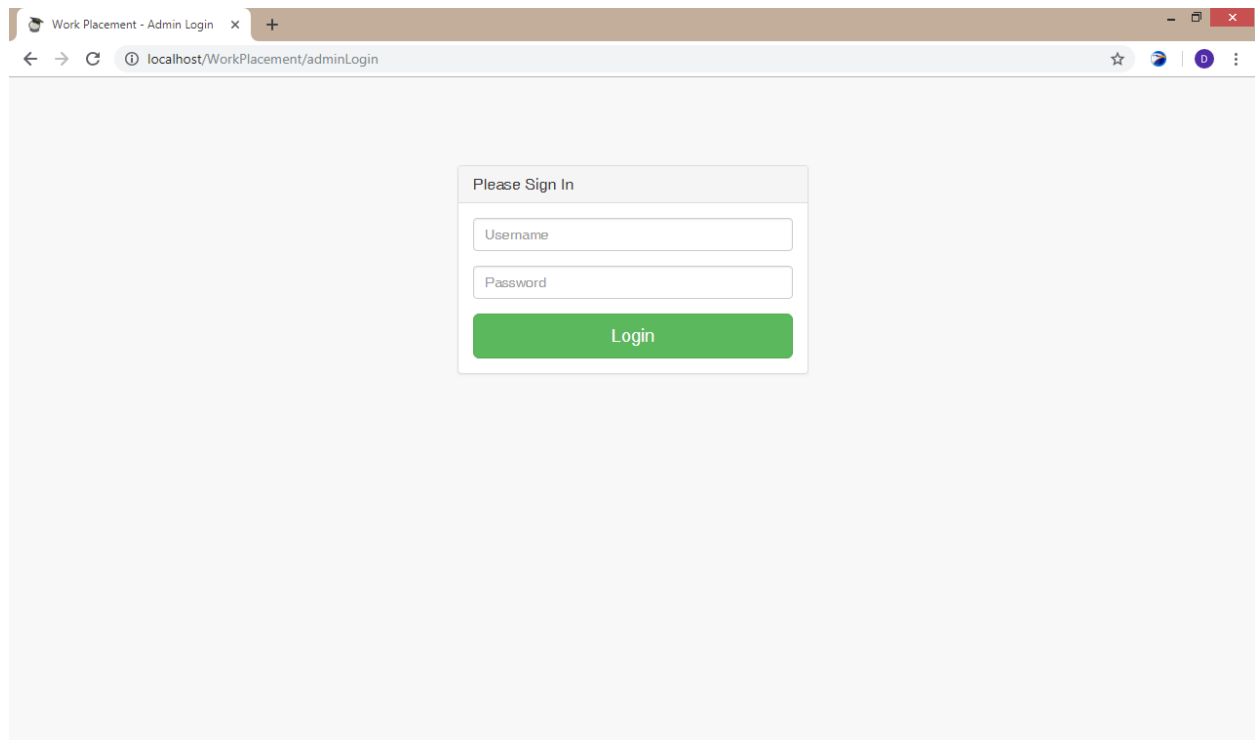
### 3.2 User Access Considerations

Every student can use application using their ID Numbers and an admin must enter username and password to use the system.

### 3.3 Accessing the System

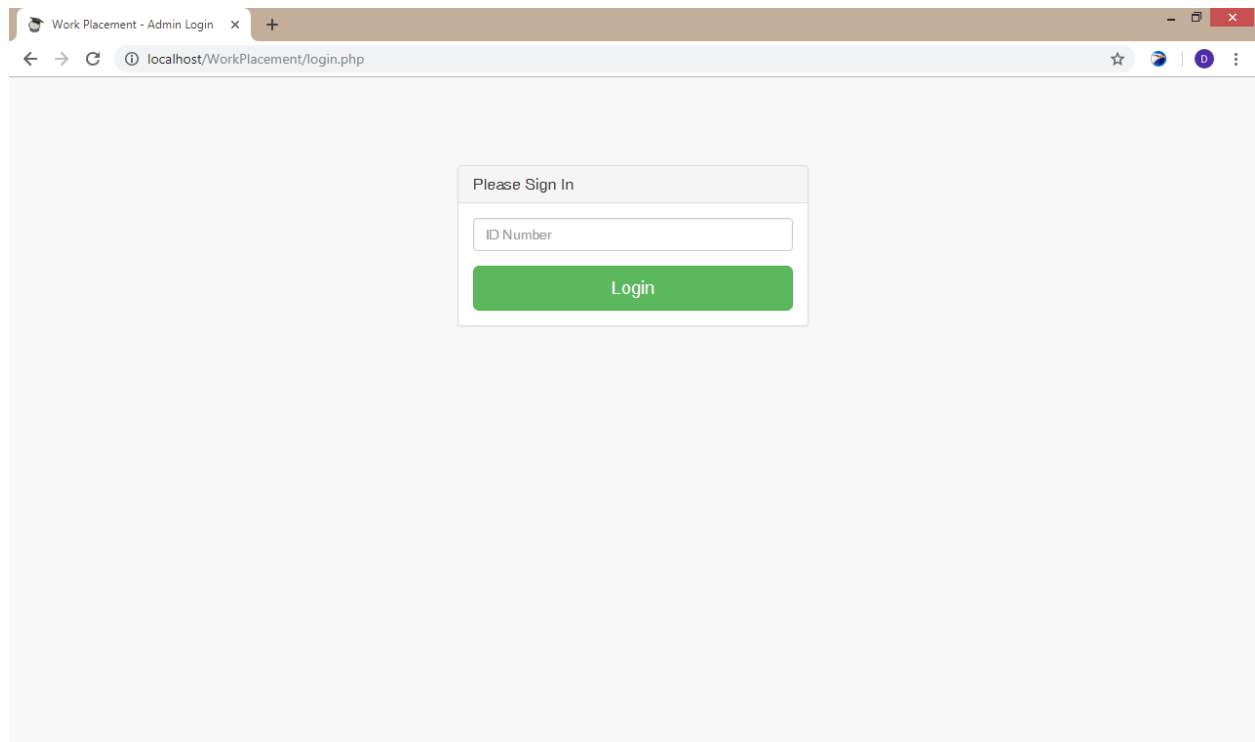
To access the system, an admin account must be created first by a legitimate database administrator in the database “studentgrade” and table “admin\_user”. This is to prevent unauthorized registration of admin users.

If an admin account is created, you must type the url “localhost/WorkPlacement/adminLogin” to login as admin, otherwise, you will be redirected into the user’s login page.



An admin's credentials can only be changed in the database by a database administrator. An admin can add student account by importing student data in the system. A student's credential is only their student number for the system.

A student can access the system by typing the url "localhost/WorkPlacement". He/She will be redirected to the login page.



## 3.4 System Organization & Navigation

**System Homepage** (currently logged in as admin):

The screenshot shows the 'Work Placement' system homepage. On the left is a navigation menu with links: Dashboard, Predict, Configuration, and Help. The main content area is titled 'Dashboard' and features three data cards: 'Total Training Data' with a value of 400, 'Computer Science' with a value of 48, and 'Information Tech.' with a value of 49. Each card has a 'View Details' link. At the bottom, a footer states 'Made with and @ Daryl's residence'.

**Predict/Import Student**

The screenshot shows the 'Computer Science' page within the 'Work Placement' system. The left navigation menu includes 'Dashboard', 'Predict', 'Computer Science', 'Information Technology', 'Configuration', and 'Help'. The main content area is titled 'Computer Science' and displays a 'Master List' table. The table has columns for 'ID Number', 'Suggested Work Placement', and 'Action'. The 'Suggested Work Placement' column for all entries is 'Not yet Evaluated'. The 'Action' column contains 'Analyze' and 'View' buttons for each row.

ID Number	Suggested Work Placement	Action
1000528	Not yet Evaluated	Analyze View
1200346	Not yet Evaluated	Analyze View
1301050	Not yet Evaluated	Analyze View
1401275	Not yet Evaluated	Analyze View
1401366	Not yet Evaluated	Analyze View
1401406	Not yet Evaluated	Analyze View
1500066	Not yet Evaluated	Analyze View
1500094	Not yet Evaluated	Analyze View

## Create Decision Tree Model

The screenshot shows the 'Train' page of the 'Work Placement' application. The browser address bar indicates the URL is `localhost/WorkPlacement/train_cs.php`. The left sidebar contains a menu with 'Dashboard', 'Predict', 'Configuration', 'Train (Computer Science)', 'Train (Information Tech.)', and 'Help'. The main content area is titled 'TRAIN' and features a green status bar stating 'System is already trained. Accuracy: 87.5%'. Below this is a green button labeled 'View Decision Tree'. A modal window titled 'Import Training Data' is open, showing an 'Import CSV' section with a 'Choose File' button and the text 'No file chosen'. At the bottom of the modal is a button with a graduation cap icon labeled 'Generate Decision Tree'.

## About the System

The screenshot shows the 'About WorkPlacement' page of the 'Work Placement' application. The browser address bar indicates the URL is `localhost/WorkPlacement/about.php`. The left sidebar contains a menu with 'Dashboard', 'Predict', 'Configuration', 'Help', and 'About WorkPlacement'. The main content area is titled 'About WorkPlacement' and contains three sections: 'About', 'Web Application', and 'Dependencies'. The 'About' section describes the system as a decision-support system for ICT students using Ross Quinlan's C4.5 algorithm. The 'Web Application' section lists the following dependencies: PHP Version: 5.6 & 7.2 compatible, Bootstrap: 3.3.7, Charts.js: 2.7.2, Font-Awesome: 4.6.3, JQuery: 3.1.0, metisMenu: 1.1.3, and Pace.js: 1.0.2. The 'Dependencies' section lists Python: 3.7.1 and Anaconda: 4.6.4.



## 3.5 Exiting the System

To exit the system, you must logout by clicking your username in the upper right part then clicking 'Logout'. Once you're back in the login page, you can close the browser window.

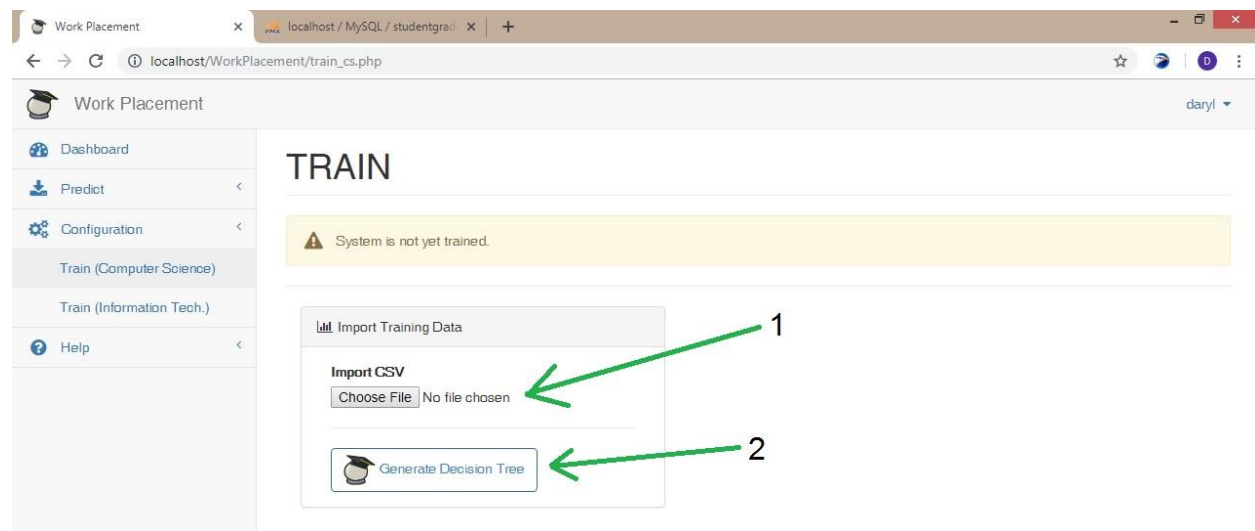


## 4. Using the System

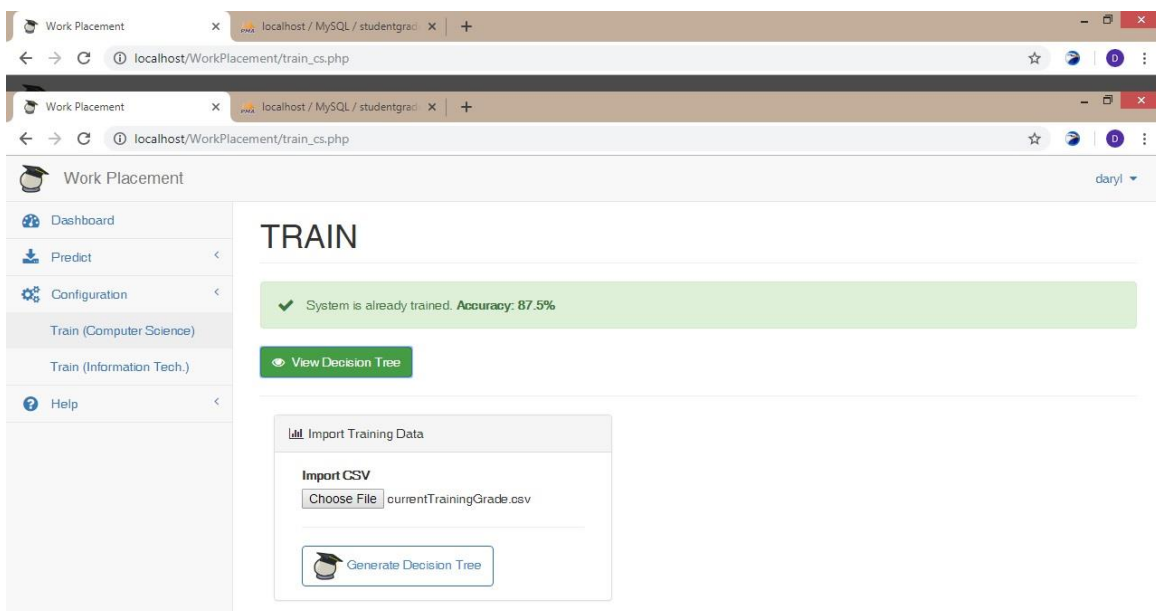
### 4.1 Importing Training Data & Generating Decision Tree

The system needs a training data in order for it to function. A training data contains sample datasets of grades and a corresponding class/job placement. For example, for a 'Web Development' class, you can create a dataset that has a high grade in 'CS122' or 'Web Development and Programming' subject.

The system provides a training data with 200 datasets and 10 classes with a filename of 'currentTrainingGrade.csv' and you can use it if you want. This dataset produces an accuracy of over 85%. You must follow the format of the given csv file if you wish to change the dataset and save the file inside the system folder.



After selecting the csv file of dataset (1), you can click the 'Generate Decision Tree' button (2) to create a decision tree model.



After generating decision tree, you can view its graphical representation by clicking the 'View Decision Tree' button. This will open a new tab that displays the decision tree image. You can now import actual student data and classify their work placements by clicking the tab Predict -> Computer Science/Information Tech.

## 4.2 Importing Student Data

The system includes a csv file for Computer Science student record with a filename of 'CSGrade50.csv' and a csv file for Information Technology student record with a filename of 'ITGrade50'. Please follow the format of the given file and then save it in the system folder.

The screenshot shows the 'Work Placement' application interface. The sidebar on the left contains navigation links: Dashboard, Predict, Computer Science (selected), Information Technology, Configuration, and Help. The main content area is titled 'Computer Science'. It features a 'Master List' section with a table that has columns for 'ID Number', 'Suggested Work Placement', and 'Action'. The table is currently empty, displaying 'No data available in table'. Below the table, it shows 'Showing 0 to 0 of 0 entries' and 'Previous' and 'Next' buttons. At the bottom, there is an 'Add Student' section with an 'Import CSV' form. This form includes a 'Choose File' button, a 'No file chosen' message, and a 'Submit' button.

Click 'Choose File' and then click 'Submit' after selecting the csv file of student grade.

The screenshot shows the 'Work Placement' application interface. On the left is a sidebar with navigation links: Dashboard, Predict, Computer Science (selected), Information Technology, Configuration, and Help. The main content area is titled 'Computer Science' and contains a 'Master List' section. Below this, there's a 'Show 10 entries' dropdown and a search bar. The table below lists 8 student records. Each record has an 'ID Number', a 'Suggested Work Placement' (all 'Not yet Evaluated'), and an 'Action' column with 'Analyze' and 'View' buttons.

ID Number	Suggested Work Placement	Action
1000528	Not yet Evaluated	Analyze View
1200346	Not yet Evaluated	Analyze View
1301050	Not yet Evaluated	Analyze View
1401275	Not yet Evaluated	Analyze View
1401366	Not yet Evaluated	Analyze View
1401406	Not yet Evaluated	Analyze View
1500066	Not yet Evaluated	Analyze View
1500094	Not yet Evaluated	Analyze View

The new student records will be displayed after importing.

### 4.3 Classifying Work Placements

After importing student grades, you can now classify their work placements by clicking the 'Analyze' button.

This screenshot shows the same 'Work Placement' application interface as before, but the first record (ID 1000528) has been updated. The 'Analyze' button is now disabled and replaced with a green 'Analyzing...' button, indicating that the classification process is in progress for that student.

ID Number	Suggested Work Placement	Action
1000528	Not yet Evaluated	Analyzing... View
1200346	Not yet Evaluated	Analyze View
1301050	Not yet Evaluated	Analyze View
1401275	Not yet Evaluated	Analyze View
1401366	Not yet Evaluated	Analyze View
1401406	Not yet Evaluated	Analyze View
1500066	Not yet Evaluated	Analyze View
1500094	Not yet Evaluated	Analyze View

Work Placement

Dashboard

Predict

Computer Science

Information Technology

Configuration

Help

Classify Done: Computer Network Architect

## Computer Science

Master List

Show 10 entries

Search:

ID Number	Suggested Work Placement	Action
1000528	Computer Network Architect	Analyze View
1200346	Not yet Evaluated	Analyze View
1301050	Not yet Evaluated	Analyze View
1401275	Not yet Evaluated	Analyze View
1401366	Not yet Evaluated	Analyze View
1401406	Not yet Evaluated	Analyze View
1500066	Not yet Evaluated	Analyze View
1500094	Not yet Evaluated	Analyze View

## 5. Troubleshooting

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### 5.1 Special Considerations

The decision tree image might appear the same even after changing the training dataset and re-generating new decision tree. In this case, you must clear the browsing data (cached images and files) in your browser.