Low Level Design

LLD

Low-Level Design (LLD)

Finance (Adult Census Income Prediction)

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# Document Version Control

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**Abstract**

We study how researchers can apply machine learning (ML) methods in finance. We establish that the two major categories of ML (supervised and unsupervised learning) address fundamentally different problems than traditional econometric approaches. We identify three approaches types of applications and give an outlook on potential future directions for both researchers and practitioners. Our results suggest large benefits of ML methods compared to traditional approaches and indicate that ML holds great potential for future research.

# Introduction

## Why this Low-Level Design Document?

The purpose of this document is to present a detailed description of internal design of the actual program Coad. It will explain the purpose and features of the system, the interfaces of the system, what the system will do, the constraints under which it must operate and how the system will react to external stimuli. This document is intended for both the stakeholders and the developers of the system and will be proposed to the higher management for its approval.

The main objective of the project is to predict if a person has an income more than $ 50K a year or not.

Receiving loans at any age for a particular reason has become a cumbersome task:

* Dataset contains personal information about individuals with their country and income.
* Automate and streamline provider workflow

An [adult census record](https://www.healthit.gov/providers-professionals/learn-ehr-basics) contains adults personal as wells as financial information, such as:

* Work Class
* fnlwgt
* Education
* Education in number of years
* Marital Status
* Occupation
* Relationship
* Race
* Sex
* Capital Gain
* Capital Loss
* Working Hours per Week
* Country
* Salary

This project shall be delivered in two phases:

Phase 1: All the functionalities with PyPi packages.

Phase 2: Integration of UI to all the functionalities.

## **Scope**

This software system will be a model evaluation and keeping the best model in the system to predict the outcomes.

* 1. **Constraints**

We will only be predicting the model on the limited number of features; additional number of features can increase model’s robustness.

## **Risks**

The possibility of losing prospective client if system is unable to predict the right candidate who is eligible for the loans.

## **Out of Scope**

Delineate specific activities, capabilities, and items that are out of scope for the project

**2.Technical specifications**

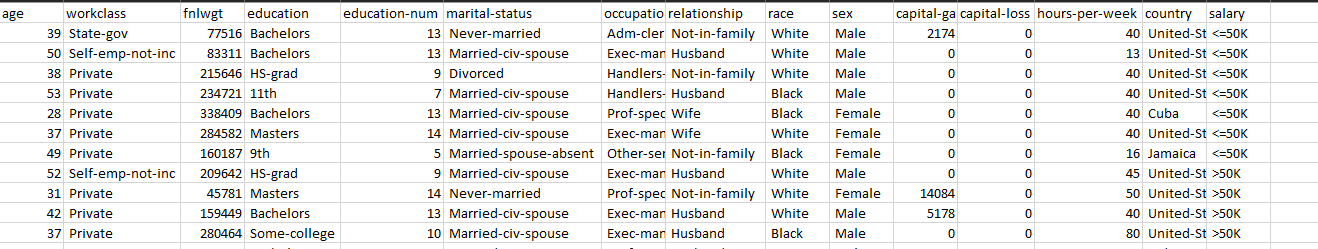
## **2.1 Dataset**



## **2.1.1 Adul Census dataset overview**

## Consists of single rectangular dataset with 32562 records, 14 feature columns and one target column. In which Age is a Numerical Discrete Variable, Work Class is a Categorical Nominal Variable, fnlwgt is a Numerical Continuous Variable, Education is a Categorical Nominal Variable, Education Num is Numerical Discrete Variable, Marital Status is a Categorical Nominal Variable, Occupation is a Categorical Nominal Variable, Race is a Categorical Nominal Variable, Sex is a Categorial Binary Variable, Capital Gain and Loss is a Numerical Continuous Variable, Hours per week is a Numerical Discrete Variable, Country is a Categorical Nominal Data and Target Variable is a Categorical Binary Variable.

* Adult Data Table



**1.2 Input schema**

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature name** | **Datatype** | **Size** | **Null/Required** |
| Age | int | 3 | Required |

## **2.2 Predicting**

The system displays a binary classification if an individual has a salary more than $ 50K or not.

## **2.3 Logging**

We should be able to log every activity done by the user.

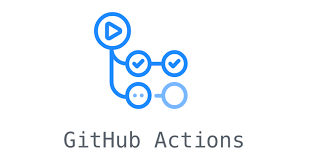
* The System is an immutable, time stamped record of discrete event that happened over time
* The System should be able to log each and every system flow.
* This system is easy to generate; it’s great when it comes to providing valuable insight, it’s focus on specific event.
* System should not be hung even after using so many loggings. Logging just because we can easily debug issues so logging is mandatory to do

## **2.4 Database**

financial datasets, a machine learning model might be able to predict the behaviour of a given asset. That’s why the financial sector is doing everything in its power to create an effective ML model, as anything that can predict even reasonably well has the potential to generate millions of dollars. Machine learning is already predicting the behaviour of citizens, which is impacting the way policy makers are doing their jobs.

* 1. **Deployment**

1. Git Action 2. AWS Lambda 3. AWS



**3. Technology stack**

|  |  |
| --- | --- |
| **Front End** | HTML/CSS/JS/React |
| **Backend** | Python Django |
| **Database** | MongoDB/MySQL/Cassandra |
| **Deployment** | AWS |

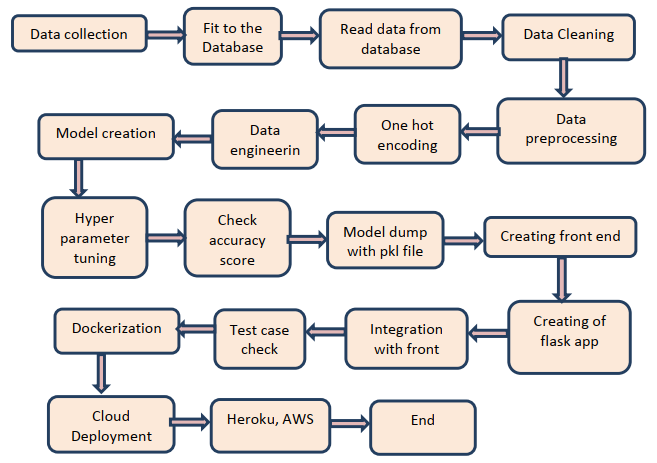
# 4.Proposed Solution

Based on the actual research paper, considering Logistic Regression as base model will help to identify the accuracy and further cross verifying with Random Forest will help to made the robust model if necessary.

1. Baseline Model: Logistic Regression, since this is a classification problem.

2. Random Forest

# Model training/validation workflow



# 6.Exceptional scenarios

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Exception | Mitigation | Module |
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|  |  |  |  |

# 7.Test cases

|  |  |  |
| --- | --- | --- |
| **Test Case Description** | **Pre-Requisite** | **Expected Result** |
| Verify whether the Application URL is Accessible to the user | Application URL Should be defined | Application URL should be Accessible to the user |
| |  | | --- | | Verify whether the Applicationloads completely for the userwhen the URL is accessed | | 1. Application URL is accessible 2. Application is deployed | The Application should load completely for the user when the URL is accessed |
| Verify whether the User is able to sign Up in the application | Application is accessible | The User should be able to sign up In the application |
| Verify whether user is able to successfully use the application | Made sure to check for the test cases from backend. | User should be able to see successfully valid results |
| Verify whether user is able to see input fields on logging | 1. Application is accessible 2. User is able to log into the application | User should be able to edit input fields on logging |

# 8.Key performance indicators (KPI)

* Determine whether you’re on track to reach your financial goals
* Evaluate the success of your strategy
* Pinpoint areas in your business that may need improvement
* Identify any opportunities and challenges
* Assess whether your customers are happy or not