**Software Requirements Specification**

For

PCause: PCOS detection system based on deep learning model using ultrasound images

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Prepared by

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1. INTRODUCTION:

Purpose of The Project

Nowadays, investing our money into the stock market is a booming trend. Over time, people have understood the worth of making their money earn for them rather than just keeping it in the bank with hardly any returns. The stock market is one of the most chosen options. Other choices can range from anything like property, gold, mutual funds, etc.

The stock market has the highest potential for extremely high returns. But this comes along with the highest risk factor too. Another big problem is managing so much of past data and analyzing it to crack the trend of stock prices. This data analysis can be done by ML with much greater accuracy than that of humans.

TradeHelp project is inspired by the growing need for reliable stock market predictions and well-informed decision-making, which aims to have important consequences for monetary gain and risk management. In this project, we will combine technical expertise with a strong interest in finance and offer helpful instructional resources for anyone looking to grasp data analysis and machine learning in a real-world setting.

Target Beneficiary

Developing an accurate stock market prediction system is essential due to the volatility and unpredictability of financial markets. Current methods often fall short, creating risks and missed opportunities for investors.

This project aims to create a reliable predictive model to improve decision-making, manage risks, and gain a competitive edge in the financial industry while considering ethical and regulatory implications.

Project Scope

Stock market predictions can be used for a variety of purposes and can benefit various types of users, including:

* **Investment decision-making:** Investors can use stock market predictions to make informed decisions about which stocks to buy, sell, or hold.
* **Risk management**: Stock market predictions can be used to help investors manage their risk by identifying stocks that are likely to be more volatile.
* **Trading strategies**: Stock market predictions can be used to develop trading strategies that exploit market inefficiencies.
* **Economic forecasting:** Stock market predictions can be used to help economists forecast economic growth and inflation.

References

[[1]Aslam, S., & Rabie, T. F. (2023, February). Principal Component Analysis in Image Classification: A review. In 2023 Advances in Science and Engineering Technology International Conferences (ASET) (pp. 1-7). IEEE.](https://ieeexplore.ieee.org/stampPDF/getPDF.jsp?tp=&arnumber=10180847&ref=aHR0cHM6Ly9pZWVleHBsb3JlLmllZWUub3JnL2RvY3VtZW50LzEwMTgwODQ3&tag=1)

[[2] Chitra, P., Srilatha, K., Sumathi, M., Jayasudha, F. V., Bernatin, T., & Jagadeesh, M. (2023, March). Classification of Ultrasound PCOS Image using Deep Learning based Hybrid Models. In 2023 Second International Conference on Electronics and Renewable Systems (ICEARS) (pp. 1389-1394). IEEE.](https://ieeexplore.ieee.org/document/10085400)

[[3] Suha, S. A., & Islam, M. N. (2022). An extended machine learning technique for polycystic ovary syndrome detection using ovary ultrasound image. Scientific Reports, 12(1), 17123.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9556522/)

[[4] Aggarwal, A., Mittal, M., & Battineni, G. (2021). Generative adversarial network: An overview of theory and applications. International Journal of Information Management Data Insights, 1(1), 100004.](https://www.researchgate.net/publication/348837975_Generative_adversarial_network_An_overview_of_theory_and_applications)

[[5] Sumathi, M., Chitra, P., Prabha, R. S., & Srilatha, K. (2021, February). Study and detection of PCOS related diseases using CNN. In IOP Conference Series: Materials Science and Engineering (Vol. 1070, No. 1, p. 012062). IOP Publishing.](https://iopscience.iop.org/article/10.1088/1757-899X/1070/1/012062/pdf)

1. PROJECT DESCRIPTION:

Dataset

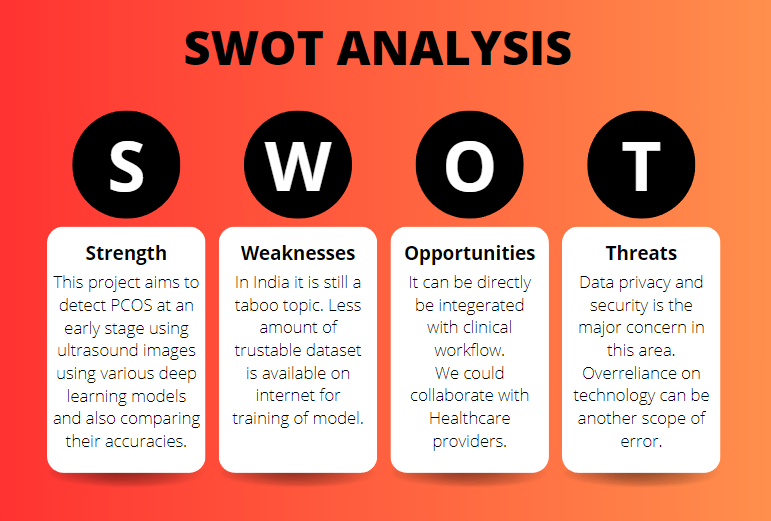
Data folder consist of 'train' and 'test' subfolders containing 2 categories of data 'infected' and 'notinfected'

infected : Images of ovaries having PCOS

notinfected : Images of healthy ovaries

The dataset is freely available on Kaggle for research purposes

SWOT Analysis



Project Features

The methodology for our TradeHelp using deep learning techniques can be outlined as follows:

**Dataset Collection**: Firstly, a large dataset of stock prices is collected for training the machine learning model.

**Model Selection**: The next step is to select the machine learning models that will be used for prediction. Several popular prediction models are Regression, Random Forest, etc.

**Model Training**: The ML model learns predictions from the training data and predicts future stock prices.

**Model Evaluation**: After training, the model needs to be evaluated on a separate validation dataset to assess its performance.

**Model Optimization**: Based on the evaluation results, the model can be finetuned and optimized to improve its performance.

User Classes and Characteristics

It can be used for the following user classes:

* Investment Bankers
* Economist
* Traders
* Researchers and Academics

Design and Implementation Constraints

* Parameter: TradeHelp could actually use an enormous number of factors to evaluate the future stock prices. But to actually build a model we have to limit our considered parameters.
* Language Limitation: Constrained to use only C++ in the project had a huge effect on limiting the model’s potential.
* Dataset: If we took all the parameters into consideration, then the dataset would have to be really huge so that model doesn’t overfit to the dataset.

Design Diagram

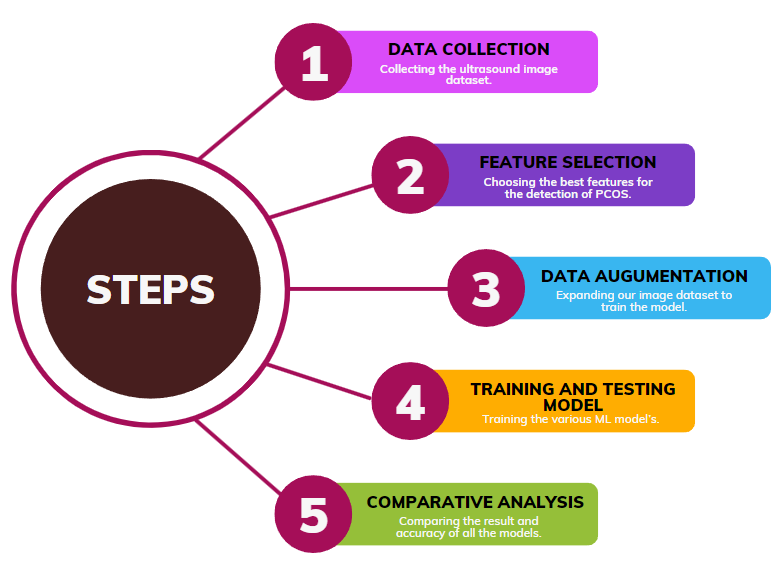


Fig 1. Workflow

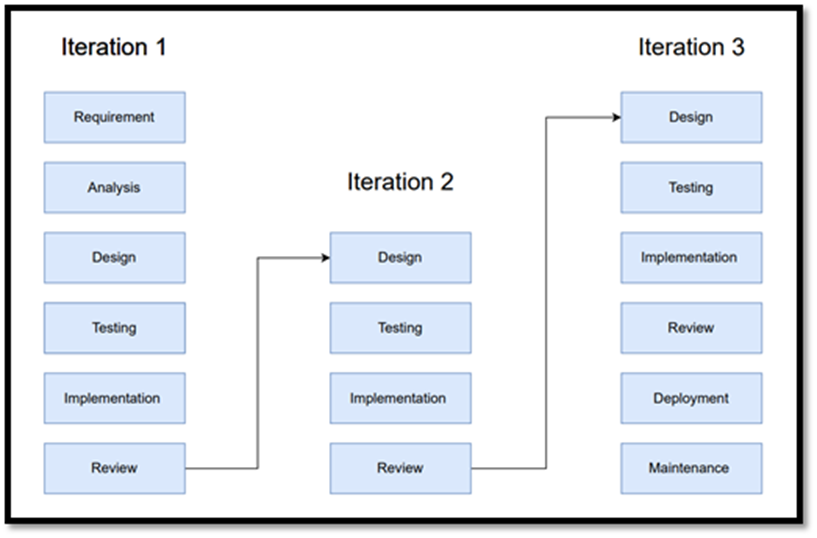


Fig 2. Iterative Model

Assumption and Dependencies

Our Project has certain assumptions as mentioned below:

1. SYSTEM REQUIREMENTS:

User Interface

We have used the command line interface to generate the output window for displaying our predictions.

Software Interface

Not applicable

Database Interface

Not applicable

Protocols

Not applicable

1. NON-FUNCTIONAL REQUIREMENTS:

Performance Requirements

The basic requirement to run this project is to have a proper installation of Python with various libraries, extensions and the availability of GPU in the local system. It enables high-speed parallel processing of large amounts of data, allowing to build deep learning model fast.

Security Requirements

The dataset is readily available on the internet. The files of our project have been uploaded on GitHub so it is accessible to everyone.

Software Quality Attributes

APPENDIX A: GLOSSARY

* PCOS-
* Principal component Analysis (PCA)-
* Generative Adversarial Network-
* Data Augmentation-
* CNN-
* VGG-16
* VGG-19
* RESNET-50
* ALEXNET