AI-LABS

OPEN-SOURCE TOOLS, TECHNOLOGIES, AND PLATFORMS

PROBLEMS/USE CASES

AI-Lab- Machine Learning & Algorithms

Abstract

Instructions for a hackathon centred around problems using an open solution platform

AI TECH UK

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Before you start

Think about what you hope to get out of this hackathon. Do you want to focus on just one technology and get the best model you possibly can, or do you want to understand all the technologies? Either is perfectly valid.
Remember learning is a journey not a destination, you can get a working model in a short period of time but what will you have learnt if you just stop there?

Overview of Problem Uses

There are four areas of AI that can be explored as part of the AI Tech UK's – open-source Hackathon offering coding in Python. These are:

01 Data Exploration
02 Machine Learning Algorithms and Applications
03 Computer Vision
04 Natural Language Processing

Each area will have a series of problems with associated notebooks and data files. For each area a structured approach is provided detailing the objective, dataset, algorithms and models and accompanying libraries, useful links, success criteria and in some cases what to do next (a question, a discussion, use of your own data, refer to a specific link/lab/task, or simply reading further resources of your choice).

02 Machine Learning Algorithms and Applications

Introduction

In the era of Industry 4.0, the abundance of data from various sources presents an opportunity to develop smart applications using artificial intelligence (AI), particularly machine learning (ML). ML allows software applications to make predictions without explicit programming by analysing historical data. Recommendation engines are a popular application of ML, as well as fraud detection, spam filtering, and predictive maintenance.

There are a series of problems for machine learning and recommendations starting off with some very basic regression, to more advanced level of movie recommendation systems.   These include:

Linear regression
Breast Cancer detection
Diabetes detection
Recommendation system – Movie recommendation based on user profiles

Objective

- Understand the Fundamentals of regression methods
- Explore Naive Bayes and its applications in medical data analysis
- Understand Content-Based Recommender System and Collaborative filtering

Approach

You will have the opportunity to explore different machine learning algorithms, including Naive Bayes for cancer and regression for diabetes prediction, and techniques for movie recommendation. Each task will involve a specific dataset and Python notebook that can be uploaded to Google Drive and accessed through Colab. Through guided instruction and experimentation with various parameters, you will gain practical experience in manipulating and analyzing data using machine learning techniques.

Dataset

- Breast Cancer
- Diabetes
- Movies dataset: ex8_movies.mat

Libraries

- Matplotlib
- Seaborn
- Pandas
- Numpy
- Tensorflow
- Sci-kit Learn
- Copy

- SciPy

Algorithms and models

- Naïve bayes
- Linear regression

Success criteria

- To demonstrate proficiency in using regression for numerical data analysis by accurately predicting outcomes and interpreting the results to make informed decisions.
- To proficiently clean, split, and train data for recommendation systems, ensuring data quality and accuracy, and utilizing appropriate techniques to evaluate performance.
- To effectively extract and analyse relevant features in cancer and diabetes data to gain insights into the diseases and develop accurate predictions for diagnosis and treatment.
- To thoroughly explore user profiles and movie data, utilizing correlation analysis to identify meaningful relationships, and successfully building, testing, and evaluating recommendation performance to enhance user experience.

Useful links

- Machine Learning Techniques:
- Recommendation systems and machine learning: driving personalization:

What to do next

Machine learning and recommendation systems have immense potential to transform various industries by enabling intelligent analysis and automated decision-making based on vast amounts of data. By leveraging machine learning algorithms, businesses can gain valuable insights into customer behaviour, preferences, and patterns, leading to more personalized and effective recommendations. This, in turn, can lead to increased customer satisfaction, loyalty, and revenue. In addition, machine learning can be used to automate tedious and repetitive tasks, freeing up time for employees to focus on more complex and strategic initiatives. Overall, the potential of machine learning and recommendation systems lies in their ability to extract meaningful insights from data, driving innovation and growth in a wide range of industries.