VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY

UNIVERSITY OF TECHNOLOGY

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

# Course: Machine Learning - 242

# Assignment 1

Class: CC01 - Group LHPD2

## Team Members, Team Repository Link and Team Report

Our repository is at this link: https://github.com/pdz1804/ML_LHPD2.

This README that we submitted to you is stored in the repository at ML_LHPD2/notebooks/assignment1/ML_LHPD2_Ass1_README.md.

Also, our team's report which contains detailed information (data analysis, data preprocessing, normalization, models training process and evaluation of those trained models) for this Assignment 1 is stored in the repository at ML_LHPD2/reports/final_project/.

| Name | Student ID |
|---|---|
| **Nguyen Quang Phu** | 2252621 |
| **Pham Huynh Bao Dai** | 2252139 |
| **Nguyen Thanh Dat** | 2252145 |
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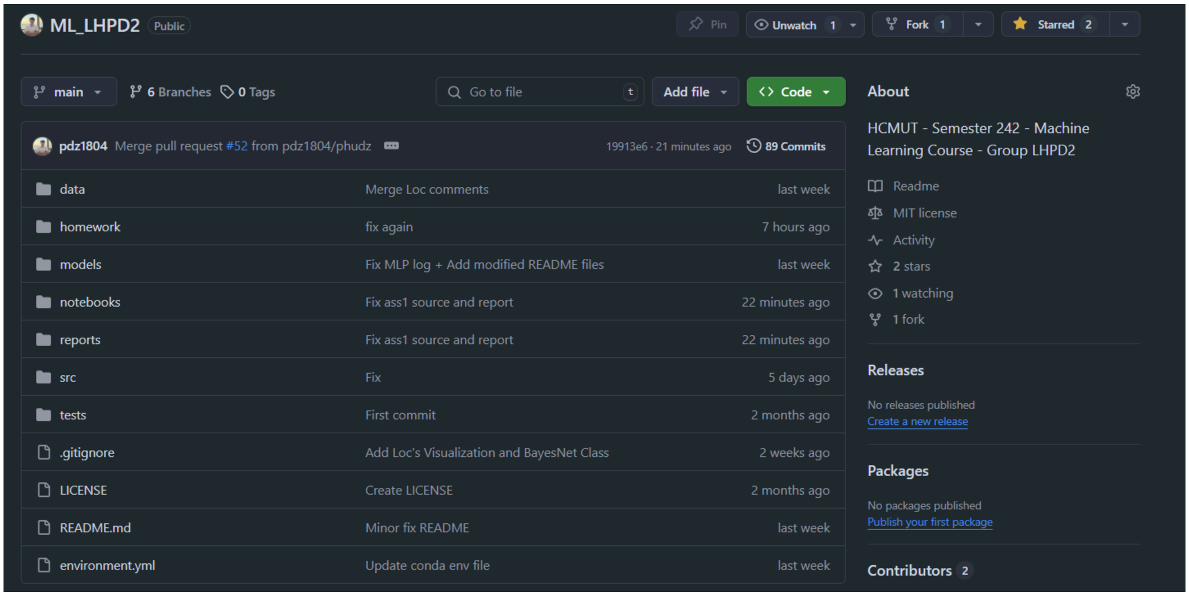
| **Nguyen Thien Loc** | 2252460 |



pdz1804 Merge pull request #52 from pdz1804/phudz 19913e6 · 21 minutes ago 89 Commits

| | | |
|---|---|---|
| data | Merge Loc comments | last week |
| homework | fix again | 7 hours ago |
| models | Fix MLP log + Add modified README files | last week |
| notebooks | Fix ass1 source and report | 22 minutes ago |
| reports | Fix ass1 source and report | 22 minutes ago |
| src | Fix | 5 days ago |
| tests | First commit | 2 months ago |
| .gitignore | Add Loc's Visualization and BayesNet Class | 2 weeks ago |
| LICENSE | Create LICENSE | 2 months ago |
| README.md | Minor fix README | last week |
| environment.yml | Update conda env file | last week |

HCMUT - Semester 242 - Machine Learning Course - Group LHPD2

No releases published
Create a new release

No packages published
Publish your first package

# I. Group Project Requirements

## 1Project Organization

**Group Formation**:

- The group consists of **5 members**.
- **Nguyen Quang Phu** is the **repository owner**.

**Collaboration Workflow**:

- The **main repository** is managed by the designated team member.
- Other members **fork** the repository and contribute via **pull requests**.
- **Roles and responsibilities** are clearly defined for each team member.

## GitHub Repository Structure

We are implementing **ALL machine learning models from the syllabus** using:

- **ONE unified dataset** with one use-case before the midterm (Chapters 2-6) (which we do in this Assignment - Assignment 1).
- **THAT dataset** for that same use-case for the second stage after midterm (Chapters 6-10) (which we will do in our Assignment 2).

**Repository Setup**:

- The **main repository** is created by the team lead.
- Team members **fork** and contribute via **pull requests**.
- **Branching strategy** is used for different models and features.
- **Comprehensive documentation** is maintained.

**Suggested Repository Structure**:

```
Project-Root
│── data/          # Raw & Processed Datasets
│── notebooks/     # Jupyter Notebooks for EDA & Preprocessing
│── models/        # ML Model Implementations
│── other/         # Some other related things here
```

```
|── reports/       # Contain figures and Reports
|── src/           # Contain src code of how to process data, build features and tra
|── tests/         # Evaluation Results & Comparisons
|── README.md      # Project Documentation
|── requirements.txt # Dependencies
```

### Key Requirements

- Well-documented problem statements & model variations
- Consistent structure for model implementations
- Comprehensive testing of all components
- Comparative analysis of models
- Code reviews and pull requests
- Version control best practices

### Each Team Member Should:

- **Actively contribute to the repository**
- **Document their work thoroughly**
- **Review and improve others' code**
- **Participate in group discussions**
- **Help maintain code quality**

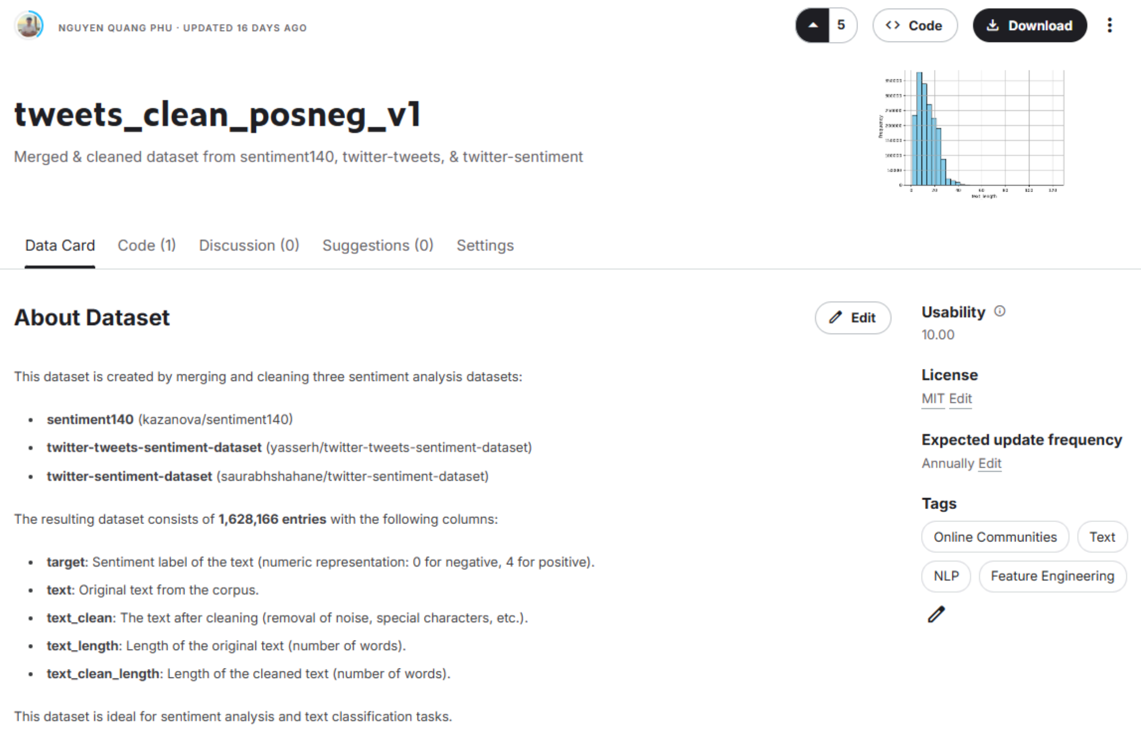
## II. Completed Tasks

### Data Collection & Preprocessing

We have **collected and preprocessed** the dataset, and it has been uploaded to **Kaggle**.

**Kaggle Dataset**: Tweets Clean PosNeg v1

**Dataset Preview:**



NGUYEN QUANG PHU · UPDATED 16 DAYS AGO

**tweets_clean_posneg_v1**

Merged & cleaned dataset from sentiment140, twitter-tweets, & twitter-sentiment

**About Dataset**

This dataset is created by merging and cleaning three sentiment analysis datasets:

- **sentiment140** (kazanova/sentiment140)
- **twitter-tweets-sentiment-dataset** (yasserh/twitter-tweets-sentiment-dataset)
- **twitter-sentiment-dataset** (saurabhshahane/twitter-sentiment-dataset)

The resulting dataset consists of **1,628,166 entries** with the following columns:

- **target**: Sentiment label of the text (numeric representation: 0 for negative, 4 for positive).
- **text**: Original text from the corpus.
- **text_clean**: The text after cleaning (removal of noise, special characters, etc.).
- **text_length**: Length of the original text (number of words).
- **text_clean_length**: Length of the cleaned text (number of words).

This dataset is ideal for sentiment analysis and text classification tasks.

**Usability**
10.00

**License**
MIT Edit

**Expected update frequency**
Annually Edit

**Tags**
Online Communities · Text · NLP · Feature Engineering

**Tasks Completed:**

- Collected **raw tweets dataset**
- Applied **data cleaning & preprocessing**
- Uploaded the final dataset to **Kaggle**

**Models that we have done in Assignment 1**

- **Train and Evaluate Models**
    - Decision Tree
    - Random Forest
    - XGBoost
    - Logistic Regression
    - Naive Bayes
    - GA, HMM, Bayesian Network
    - MLPClassifier and simple Perceptron (ANN)
    - CNN / LSTM for deep learning
- **Compare Model Performance**
- **Create Visualizations for Analysis**
- **Write Final Report & Documentation**

## IV. Contributions and Task Distribution

| Team Member | Task |
|---|---|
| **Nguyen Quang Phu** | Team leader; Repository management; Participate and Ensure everything stays on schedule and verify all work done by other members. |
| **Pham Huynh Bao Dai** | Data preparation; Data preprocessing; feature engineering; Visualization; Document Data Collecting; Preprocessing and Merging. |
| **Nguyen Thanh Dat** | Consistent model training and evaluating; Model implementation (Decision Tree, Random Forest, XGBoost, Perceptron - ANN, MLP); Document Model Implementation. |
| **Nguyen Tien Hung** | Consistent model training and evaluating; Model implementation (GA, HMM Bayesian Network, Logistic Regression, LSTM); Document Model Implementation. |
| **Nguyen Thien Loc** | Model evaluation, hyperparameter tuning, Model Comparison, Document Performance analysis. |

## V. How to Run This Project

### Clone the Repository

```
git clone https://github.com/pdz1804/ML_LHPD2
cd ML_LHPD2
```

### Setting Up the Environment

If you want to train the model in local (on your computer, in VSC...), to install the necessary dependencies, refer to the environment file (`environment.yml`) provided in the repository. Ensure you have Conda installed to create and activate the required environment.

```
conda env create -f environment.yml
conda activate ml_env  # Replace ml_env with your environment name
```

### Explore the Project

- First, you should revisit the Project structure above to see what is the use of those folders and subfolders in this project.
- In details:
    - To know how we collect all the data, visit the `data` folder.
    - To see the final preprocessing dataset, visiting this link: Tweets Clean PosNeg v1
    - To know how we preprocessing, make all the datasets consistent and how do we merge them together, visit the location `src/data/process.ipynb` and its utility file `src/data/preprocess.py`
    - To know how and what we use to make the features for all the texts/documents in the dataset, visit the location `src/features/build_features_utils.py`
    - To know how we perform hyperparameter tuning, do k-fold cross-validation and train our models, visit `src/models/models_utils.py` and `src/models/train_model.ipynb`
    - We have also created some visualization functions inside the location `src/visualization/`. Although now we have not used it anywhere in code because all the visualization or plotting now we just use the **in-line-function-plotting**, but we intend to use it later in Assignment 2.
    - The `environment.yml` contains the information about the libraries or dependencies that we use when performing and executing our project.

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## VI. License

This project is licensed under the **MIT License**.

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## VII. Contact

For any questions or contributions, please contact:

- Email: phu.nguyenquang2004@hcmut.edu.vn
- GitHub: https://github.com/pdz1804/

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## Contributors

**We fairly contribute to this repository with dedication and teamwork!**

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