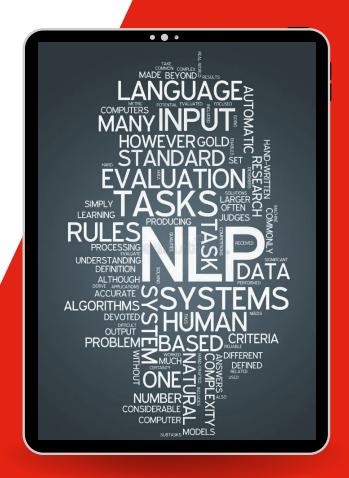
Deployment NLP APP

Muhajir Akbar Hasibuan

Class Meeting 12

2023



Muhajir Akbar Hasibuan Data Scientist



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Experience

Telkom Indonesia

Sept 2020 - present

- Develop internal and external use cases
- · Provide data understanding in making a model
- · Provide Preparation and data engineering according to the use case implemented
- · Provide data validation so that the analysis results are as expected
- · Building modeling for the development or improvement of internal and external programs
- · Provide descriptive and diagnostic insight into data processing
- · Recommend and define new growth hacking strategy for digital marketing team

Project

- · Pioneered a Robust Big Data Solution for MyIndihome, Revolutionizing Customer Experiences
- Orchestrated a High-Performing ML Team, Elevating myIndihome TV's Personalized Content Impact by 25%
- Envisioned and Executed a Cutting-Edge Big Data Solution for Elevated Customer Engagement on mvIndihomeTV
- Fueled Business Insights via Dynamic Data Profiling, Performance Dashboards, and Insights for Langit Musik, RBT, and Upoint
- · Engineered Innovative Big Data Solutions that Propelled Growth for PadiUmkm (E-Commerce)
- · Powered Success for GameQoo through Strategic Big Data Solutions
- Architected and Established MLOps Framework, Elevating Telkom Indonesia's Digital Business Products
- Crafted Visionary Video Analytics Solutions for Telkom Indonesia's Revolutionary Digital Business IoT Product

MEMBER OF DATA SCIENTIST TASK FORCE | NOVEMBER 2021 - PRESENT MEMBER OF AI TASK FORCE | NOVEMBER 2022 - PRESENT

A Pool of data scientists and AI Engineer Expert in Telkom Indonesia. It was established to leverage data-driven culture for decision-making within the organization. (Applied Research, Standardization, Consultation)

Achievement

BEST Talent of the Year at Telkom Indonesia, Digital Business and Technology Division - Digital Technology and Platform -2022

Codex by Telkom Indonesia

- Building Data Pipeline for Langit Musik Recommender System
- · Business Analytic for Langit Musik
- · Build Recommender System for Langit Musik

Universitas Syiah Kuala

· Bachelor of Science, Statistics

Skills

Hard Skills

- · Data Analytics
- Statistics
- · Machine Learning
- · Deep Learning
- MlOns
- Business Intelligence
- · Data Engineering
- Cloud Computing
- Time Series & Demand Forecasting
- · Natural Language Processing
- Fraud & Anomaly Detection
- Computer Vision

- Tools Skills
- Python
- Pyspark
- Sql
- · Apache Airflow
- GCP
- Docker
 MLflow
- · Prometheus
- Evidently
- Grafana
- · Redash, Metabase, Superset, Looker Studio
- Pytorch

Apr 2020 - Sept 2020

2015-2020

Class Meeting 1: Introduction to NLP (1 session) Introduction to NLP Basics of text data and its characteristics The importance of NLP in today's world Overview of the course structure and objectives Class Meeting 2: Text Preprocessing (1 session) Understanding the text preprocessing pipeline Tokenization, stemming, and lemmatization Stop words removal Hands-on exercises with Python for text preprocessing	Class Meeting 6 Introduction to Topic Modeling(1 session) Introduction to topic Modelingg Topic Modeling Implementation LDA(Latent dirichlet allocation) Hands-on exercises with Topic Modeling mid term Class Meeting 8: Sesi Khusus deep Learning Class Meeting 9: Introduction to Word Embeddings (1 session) Fundamentals of word embeddings Word2Vec, GloVe, and FastText	Class Meeting 14-15: Project Work (2 sessions) Dedicated sessions for students to work on NLP projects with guidance and assistance. Class Meeting 16: Project Presentations and Conclusion (1 session) Students present their NLP projects Recap of key takeaways from the course Discuss further resources for NLP enthusiasts Course conclusion and feedback
Class Meeting 3: Text Representation (1 session) Introduction to text representation techniques Bag of Words (BoW) and Term Frequency-Inverse Document Frequency (TF-IDF) n-gram Word embeddings (Word2Vec, GloVe)**just an introduction Practical exercises on text representation Class Meeting 4: Introduction to ML, DL Supervised and Unsupervised (1 session) Introduction to deep learning (ML) Introduction to deep learning (DL) DL vs. traditional machine learning (ML) Machine Learning and their applications Neural networks and their applications Basic ML DL concepts and terminology	Word embedding applications Hands-on exercises with word embedding Class Meeting 10: Attention Mechanisms (1 session) Introduction to attention mechanisms Self-attention and multi-head attention Transformers architecture Practical examples of attention in NLP Class Meeting 11: Transformer Models (1 session) In-depth study of the Transformer model Pre-trained transformer models (BERT, GPT-2) Fine-tuning transformers for NLP tasks Transformer-based applications	
Class Meeting 5: Sentiment Analysis (1 session) What is sentiment analysis? Data collection and labeling for sentiment analysis Building a sentiment analysis model Practical sentiment analysis examples Class Meeting 6: Text Classification (1 session) Introduction to text classification Binary and multi-class classification Building a text classification model	Class Meeting 12: Advanced NLP Topics (1 session) Advanced NLP topics such as BERT, XLNet, and RoBERTa Transfer learning in NLP Ethics in NLP Recent developments and trends in NLP Class Meeting 13: Advanced NLP Topics and Deployment Process session) Introduction to LLM	in Industry (1
Real-world text classification examples	Introduction to LLM Introduction how industry utilize NLP to generate revenue Introduction MLOps for NLP(bonuses from practitioners)	

Agenda

- NLP in Production

ML Workflow

A Beginner's Guide to The Machine Learning Workflow

1 ∰ Project setup

1. Understand the business goals

Spook with your stakeholders and deeply understand the business goal behind the model being proposed. A deep understanding of your business goals will help you scope the necessary technical solution, data sources to be collected, how to evolutia model performance, and more.

2. Choose the solution to your problem

Once you have a deep understanding of your problem—facus on which category of models drives the highest impact. See this Machine Learning Cheat Sheet for more information. 2 Data preparation

1. Data collection

Collect all the data you need for your models, whether from your own organization, public or paid sources.

2. Data cleaning

Turn the messy raw data into clean, tidy data ready for analysis. Check out this <u>data cleaning checklist</u> for a primer on data cleaning.

3. Feature engineering

Manipulate the datasets to create variables (features) that improve your model's prediction accuracy. Create the same features in both the training set and the testing set.

4. Split the data

Randomly divide the records in the dataset into a training set and a testing set. For a more reliable assessment of model performance, generate multiple training and testing sets using cross-validation.

Modeling 1. Hyperparameter tuning For each model, use huperparameter tuning techniques to improve model performance. 2. Train your 4. Assess model performance models For each model, calculate Fit each model to the performance metrics on the training set. testing set such as accuracy, recall and precision. 3. Make predictions Make predictions on the testing set.

4 Deployment

1. Deploy the model

Embed the model you chose in dashboards, applications, or wherever you need it.

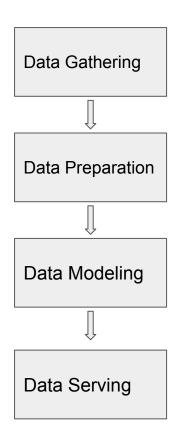
2. Monitor model performance

Regularly test the performance of your model as your data changes to avoid model drift.

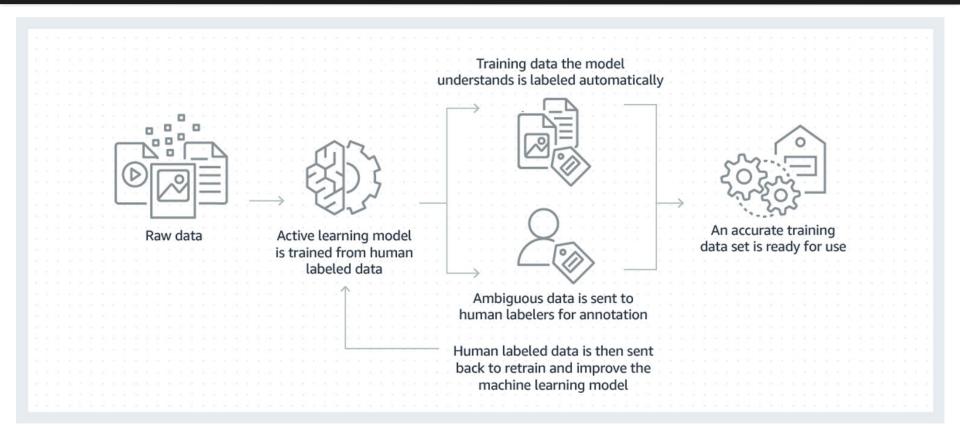
3. Improve your model

Continously iterate and improve your model post-deployment.
Replace your model with an updated version to improve
performance.

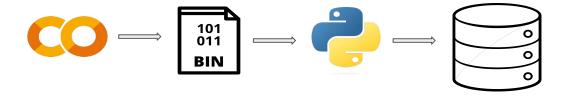
Case of NLP (Text Classification)



Data Preparation



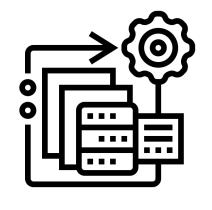
Data Modeling





If the infrastructure is not robust, Google Colab can be used, leveraging its free GPU resources to execute tasks, and subsequently obtain the binary model file after fine-tuning process.

Data Serving



Batch Prediction



API end Point Prediction

DSTF

API

FastAPI

End User with Browser





API



Server Back-end System





Customer

Make the Order

Delivery of order



Waiter





Chef

FastAPI



- High performance
- Easy to use
- Data validation
- Integrated security and authentication
- Auto-generated documentation
- O Dependency injection
- Asynchronous code support
- Reduced errors by 40%

To produce a machine learning model, the typical approach is to wrap it in a **REST API** and use it as a **microservice**. One of the most widely used frameworks for creating APIs is FastAPI.

FastAPI

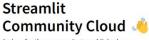
```
@ main.py > ...
      from fastapi import FastAPI
      from pydantic import BaseModel
      import uvicorn
      from predictor import endpoint
      import numpy as np
      app = FastAPI()
      class ReviewRequest(BaseModel):
          text: str
      class ReviewResponse(BaseModel):
          prediction: str
      @app.post("/predict", response_model=ReviewResponse)
      async def predict_sentiment(request: ReviewRequest):
          prediction = endpoint(request.text)
          my_array = np.array(prediction)
          result_str = my_array[0]
          return ReviewResponse(prediction=result_str)
      if __name__ == "__main__":
          uvicorn.run(app, host="0.0.0.0", port=8000)
 28
```

FastAPI - get

```
Responses
Curl
curl -X 'POST' \
  'http://127.0.0.1:8000/predict' \
  -H 'accept: application/json' \
  -H 'Content-Type: application/json' \
  -d '{
  "text": "aplikasinya jelek"
Request URL
http://127.0.0.1:8000/predict
Server response
Code
            Details
200
            Response body
               "prediction": "negative"
                                                                                                                                                                                             Download
            Response headers
              content-length: 25
              content-type: application/json
              date: Fri,24 Nov 2023 11:08:08 GMT
               server: uvicorn
```

Web - App for Portofolio

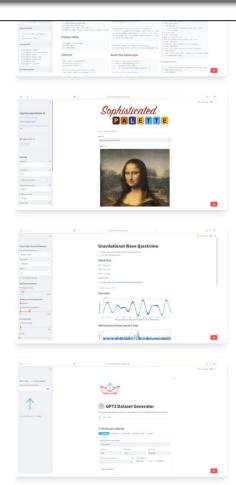




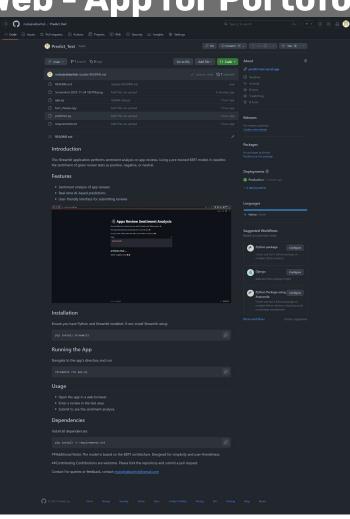
A place for the community to publicly share Streamlit apps and learn from each other!



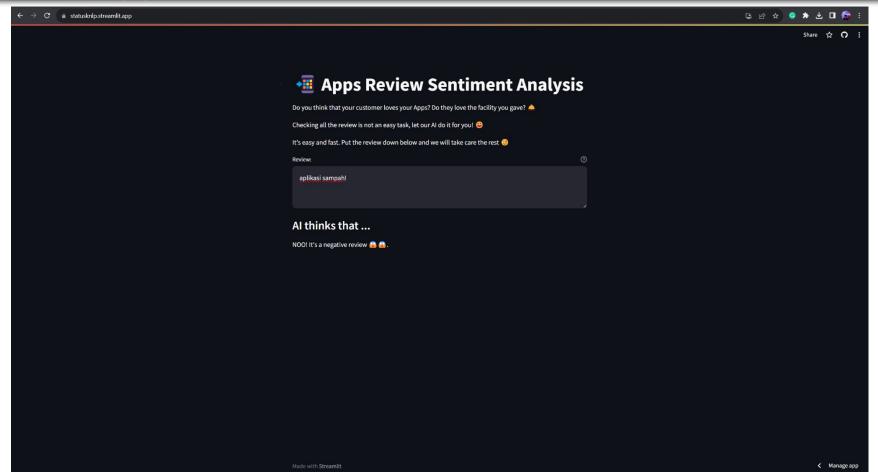
By logging in, I agree to the Terms of Service and understand Streamlit will process my personal information in accordance with its Privacy Notice.



Web - App for Portofolio



Web - App for Portofolio



Python Time

