**Seminar Nasional Teknologi Informasi dan Komunikasi-2020**
*"Inovasi Disruptif Teknologi Informasi di Era Normal Baru"*

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# MATERI SEMINAR NASIONAL TEKNOLOGI INFORMASI DAN KOMUNIKASI

## (SENATIK 2020)

### Oleh Pemateri 3

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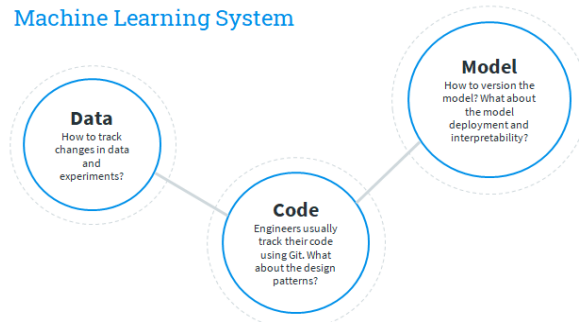
## 1.

# Data Version Control

The management and versioning of datasets and models.

# What is DVC?

DVC is an open-source version control system for machine learning projects
https://dvc.org/

## DVC Key Features

### Git Compatible

DVC claims to be compatible with any standard Git provider or server (GitHub, GitLab, etc.).

### Storage Agnostic

DVC supports all of the popular cloud storages, such as Amazon S3, Aliyun OSS, Azure Blob Storage, and Google Cloud Storage. It also supports Google Drive, HDFS, HTTP, and SSH/SFTP.

### ML Pipeline Framework

DVC has a built-in way to connect ML steps into a DAG and run the full pipeline end-to-end. DVC handles caching of intermediate results and does not run a step again if input data or code are the same.

### Language Agnostic

DVC supports all languages and frameworks/libraries, including Python, R, Scala, PyTorch, Scikit-learn, and Tensorflow.

### Metrics & Params Tracking

DVC enables user to track metrics and params produced and used in every experiment, so that the user can pick the best version.
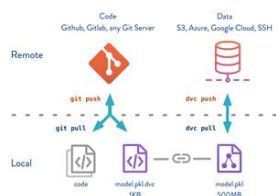
### Reproducible

Experiments in DVC can be easily reproduced with a single 'dvc repro' command.

## DVC Functionality Layers

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DVC Functionality Layers (Cont'd)

**Data Pipelines**

**Experiments**

# 2.

# Embed, Encode, Attend, Predict, and Ensemble

The deep learning formula for NLP models.

"

*When people think about machine learning improvements they usually think about efficiency and accuracy, but the most important dimension is generality.*

**Matthew Honnibal – Founder of Explosion AI & The Maker of spaCy**

## Ensemble & Model Averaging

- Model averaging ensemble
- Weighted average ensemble (with grid search, GA, PSO, etc.)
- Stacking ensemble (with meta-learner)

*"The reason that model averaging works is that different models will usually not make all the same errors on the test set."* – **Goodfellow, et. al., Deep Learning**

### Embed

An embedding table maps long and sparse vectors to dense and short vectors.
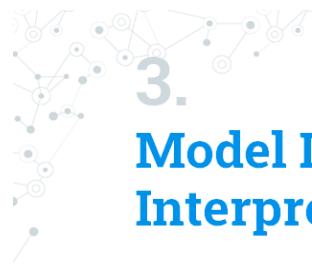
### Encode

The encode step maps a sequence of word vectors to a representation where each row represents the meaning of each token in the context of the rest of the sentence.

### Attend

The attend step reduces the matrix representation from the encode step to a single vector with the help of auxiliary context vector.

### Predict

The predict step maps the single vector to the target representation, for example class ID.

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# 3.

# Model Deployment & Interpretability

Deploy models as web APIs and the art of understanding our models.

## Things to be Considered When Deploying Models as API

### Minimal to Zero Downtime

Users expect applications to be available all the time, so minimizing downtime in deployment is very important. Common deployment strategies are blue-green and rolling updates.

### Logging

Logging is the foundation for solving operational problems, so keeping API logs is also very important. It helps us to make sure the API is running well and to provide the reason behind an error/unsuccessful operation.

### API Performance Monitoring

Keeping track and monitoring the model predictions can give an insight on how well the model is doing in production environment.

### Autoscaling

Automatically scale APIs to handle production traffic. It helps to maximize the resources and to reduce the infrastructure cost.

# Cortex

Cortex helps you deploy any model as web API, manage API updates with no downtime, track predictions, and scale machine learning in production
https://www.cortex.dev/

## Model Interpretability

- ◎ **Problem**: ML/DL models are usually "black box"
- ◎ **Goal**: understand feature importance or perform a deep dive on neural networks to understand neuron and layer attributions.
- ◎ **ML**: Local interpretable model-agnostic explanations (LIME), SHapley Additive exPlanations (SHAP).
- ◎ **DL**: Integrated libraries. Several libraries are available, for example Captum for PyTorch.

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## Model Interpretability (Cont'd)

| True Label | Predicted Label | Attribution Label | Attribution Score | Word Importance |
|---|---|---|---|---|
| pos | pos (0.99) | pos | 1.54 | It was a fantastic performance ! pad |
| pos | pos (0.71) | pos | 1.69 | Best film ever pad pad pad pad |
| pos | pos (0.95) | pos | 1.49 | Such a great show ! pad pad |
| neg | neg (0.18) | pos | -1.19 | It was a horrible movie pad pad |
| neg | neg (0.22) | pos | -1.70 | I 've never watched something as bad |
| neg | neg (0.38) | pos | -1.29 | It is a disgusting movie ! pad |

# Thanks!

## Any questions?

You can find me at:
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## References/Sources

◎ Part 1:
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◎ Part 2:
   https://explosion.ai/blog/deep-learning-formula-nlp
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   https://venturebeat.com/2019/10/10/facebooks-captum-brings-explainability-to-machine-learning/
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