Indonesian Language Model

Using

Universal Language Model Fine-tuning for Text Classification

(ULMFiT)

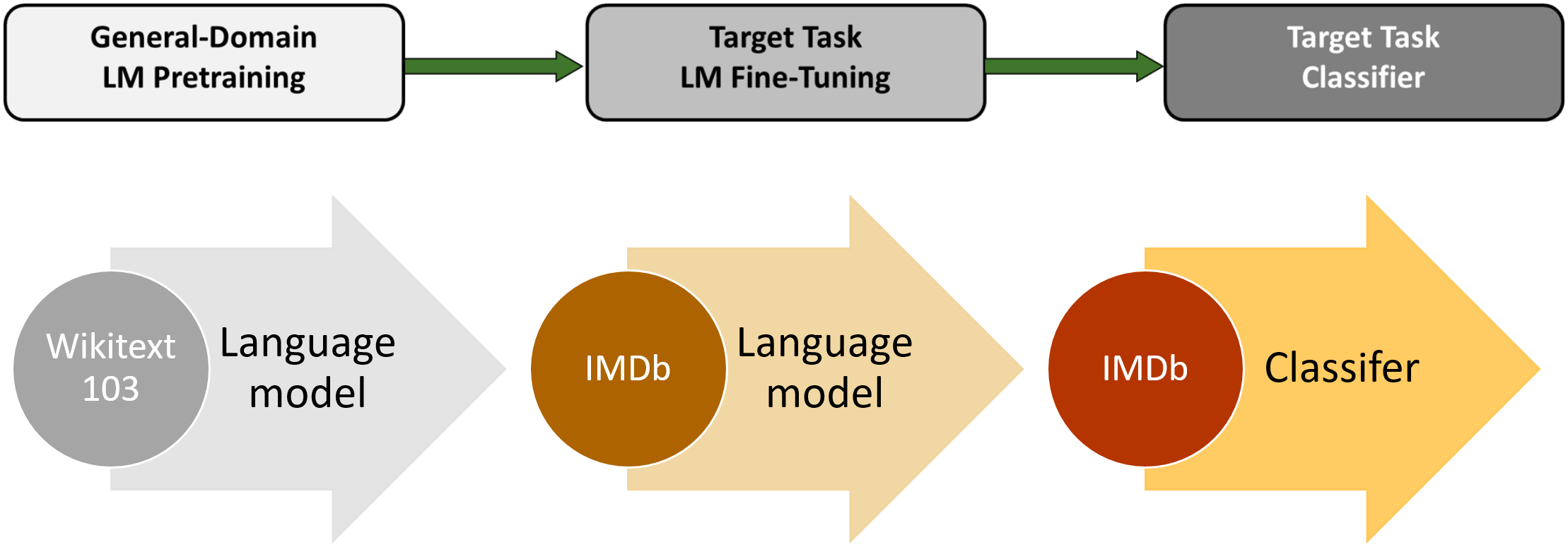
Language Model

- Predicting the next word based on previous words
  - Joko Widodo adalah …
- One of main researches on NLP
- Applications: speech recognition, text classification, text recognition, machine translation, semantic extraction, etc…

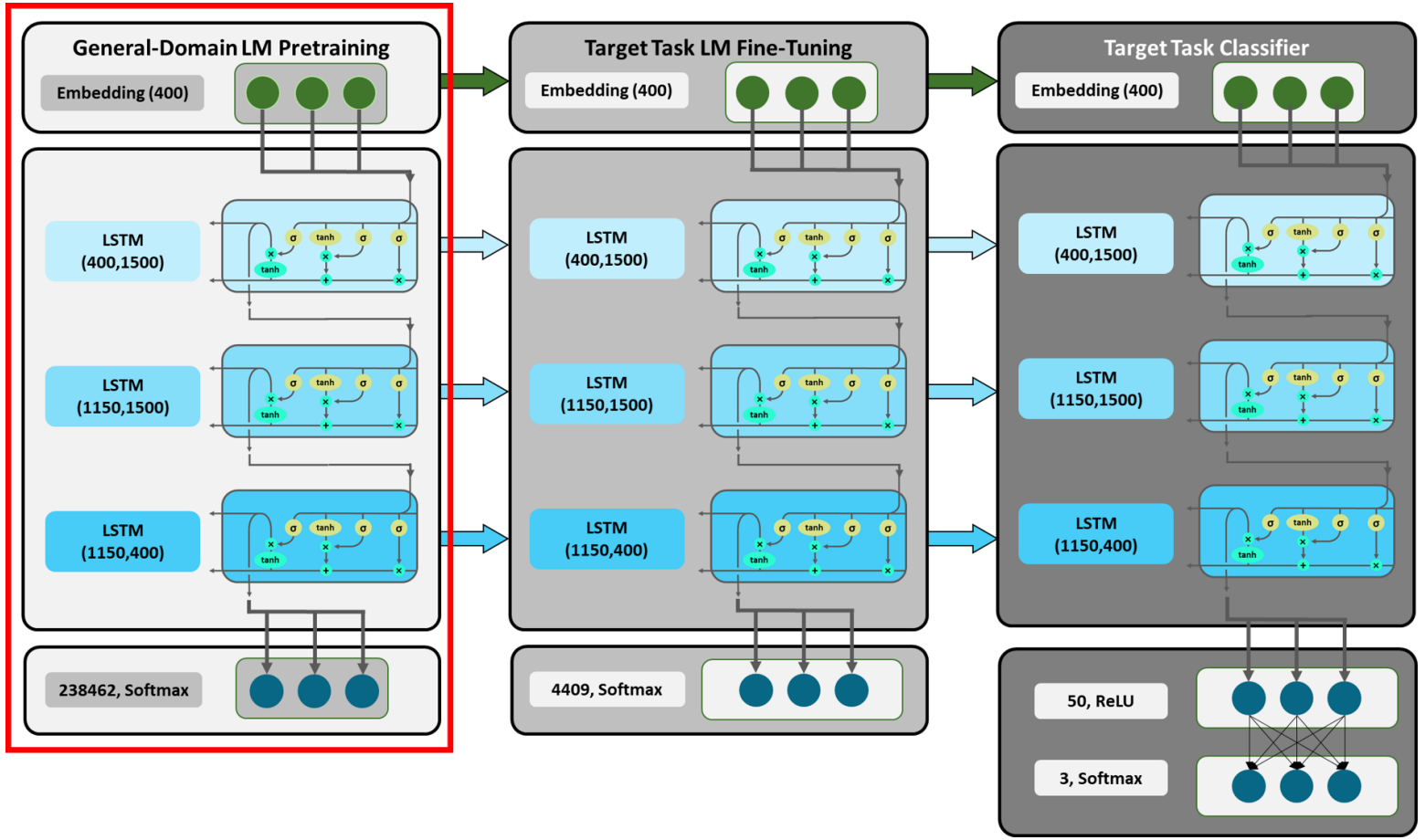
Type of Language Model

- N-Gram based LM
- Neural network based LM

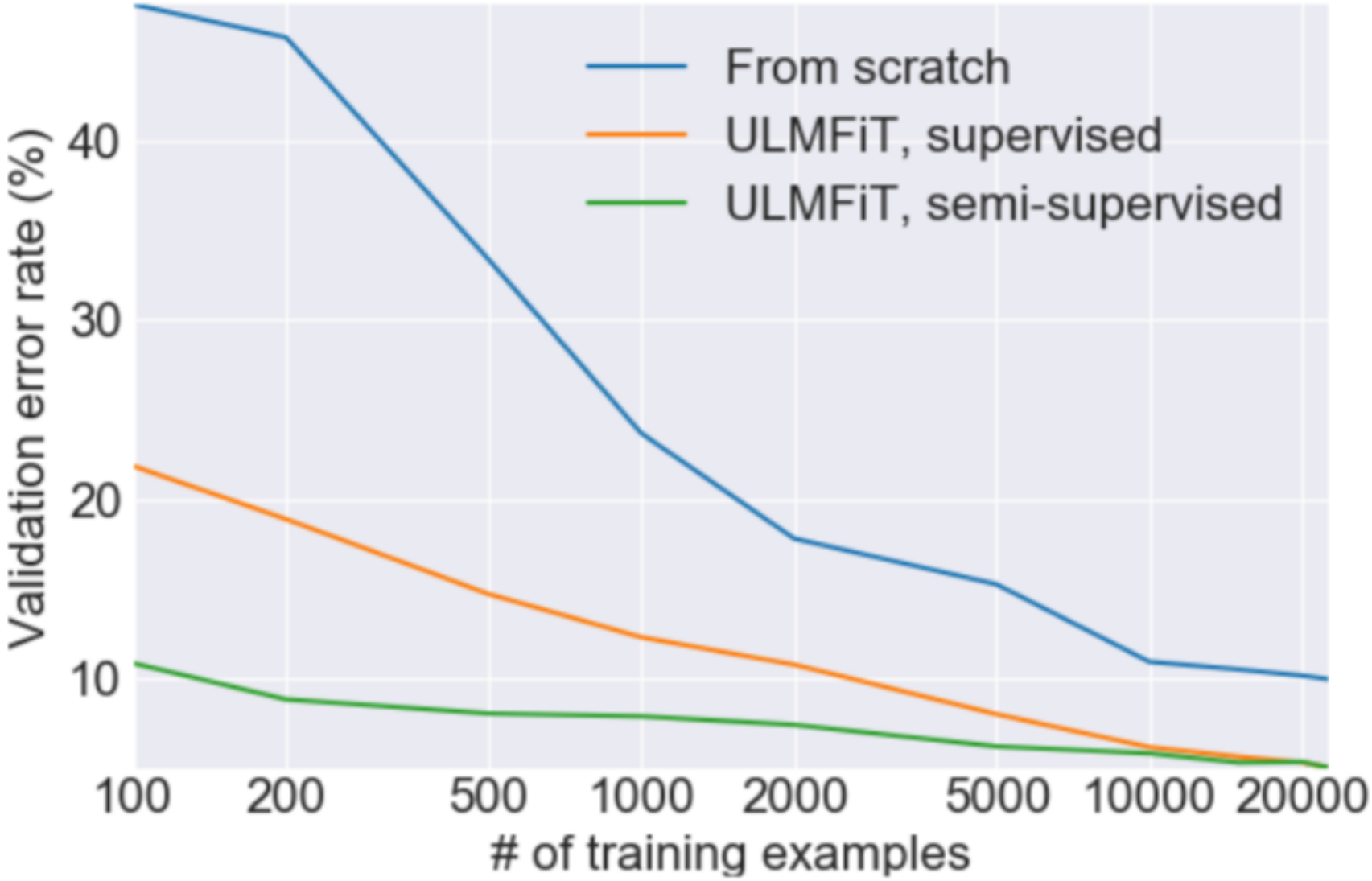
Universal Language Model Fine-tuning for Text Classification (ULMFiT)



ULMFiT Architecture



ULMFiT on Text Classification



ULMFiT for Bahasa Indonesia

- Dataset: Indonesian Wikipedia
  - > 400K articles
  - Vocabulary size: 60K
- Perplexity: 27.67
  - Comparison:
    - 400 (?) on N-Gram Indonesian LM
    - 40.68 on English wikitext2 (Yang et al, 2017)
    - 29.2 on English wikitext103 (Rae et al, 2018)

ULMFiT for Bahasa Indonesia

Text Classification

- Dataset: Word Bahasa Indonesia Corpus and Parallel English Translation (BPPT) for PAN Localization
  - indonesian-english translation
  - 500K words
  - Categories:
    - Economy
    - International
    - Science
    - Sport

ULMFiT for Bahasa Indonesia

Text Classification

- Performance Comparison:

Name	Accuracy
NB, Count Vectors	0.9269
NB, WordLevel TF-IDF	0.9162
NB, N-Gram Vectors	0.7822
NB, CharLevel Vectors	0.8433
LC, Count Vectors	0.9265
LC, WordLevel TF-IDF	0.9179
LC, N-Gram Vectors	0.8085
LC, CharLevel Vectors	0.8888
SVM, N-Gram Vectors	0.7970
RF, Count Vectors	0.8392
RF, WordLevel TF-IDF	0.8338
Xgb, Count Vectors	0.8087
Xgb, WordLevel TF-IDF	0.8070
Xgb, CharLevel Vectors	0.8202
CNN	0.9263
Kim Yoon’s CNN	0.9163
RNN-LSTM	0.9305
RNN-GRU	0.9296
Biderectional RNN	0.9267
RCNN	0.9221
FasText(1)	0.8550
ULMFit	**0.9563**

ULMFiT for Bahasa Indonesia

Text Generation

https://lmzoo.uncool.ai/text-generator/

Future Work for Indonesian Language Model

- Language Model based on OpenAI GPT2
  - Dataset collections
  - Training on 100+ Google TPUs with the help from Tensorflow Research Cloud https://www.tensorflow.org/tfrc