Deep Learning

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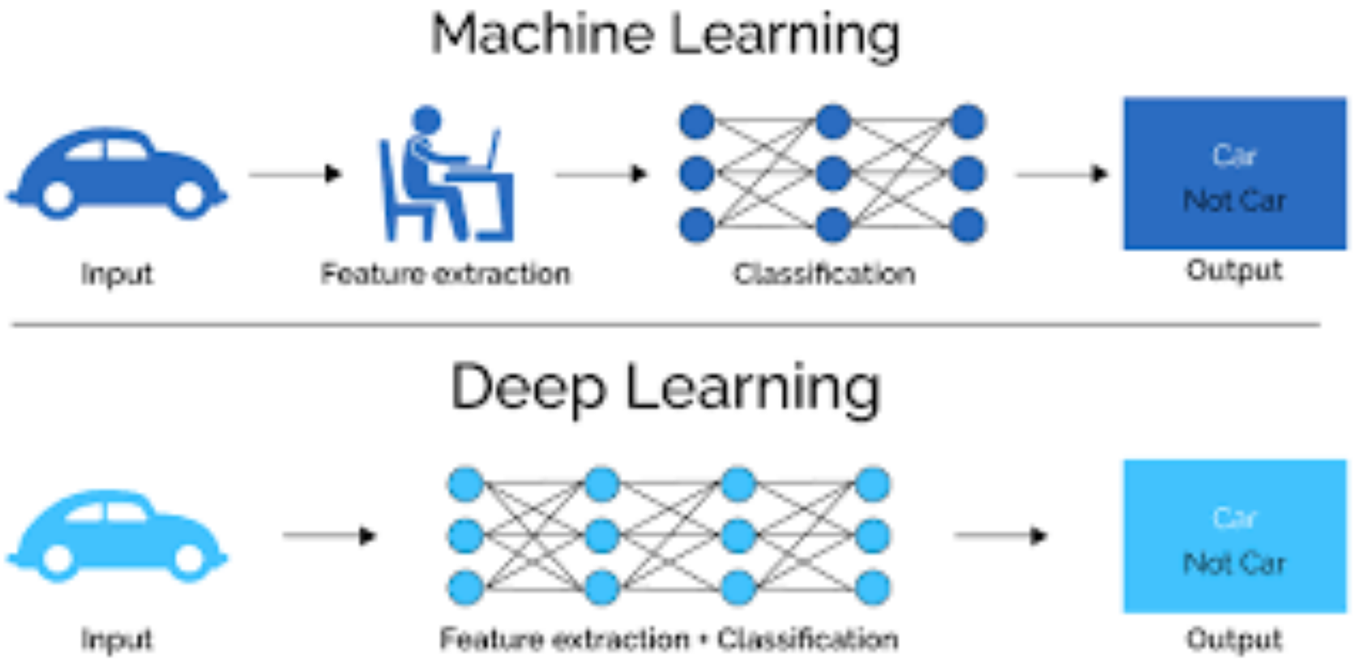
Supervised Learning

- Training by showing examples - no programming
- Tweaking the parameters when output is wrong
- Applications (when lot of data)
  - Speech Recognition
  - Image Classification
  - Medical Imaging
  - Photo caption
  - Topic Modeling
  - Self-driving vehicles

Deep Learning

- Traditional Machine Learning
  - Hand Engineered Features -> Trainable Classifier

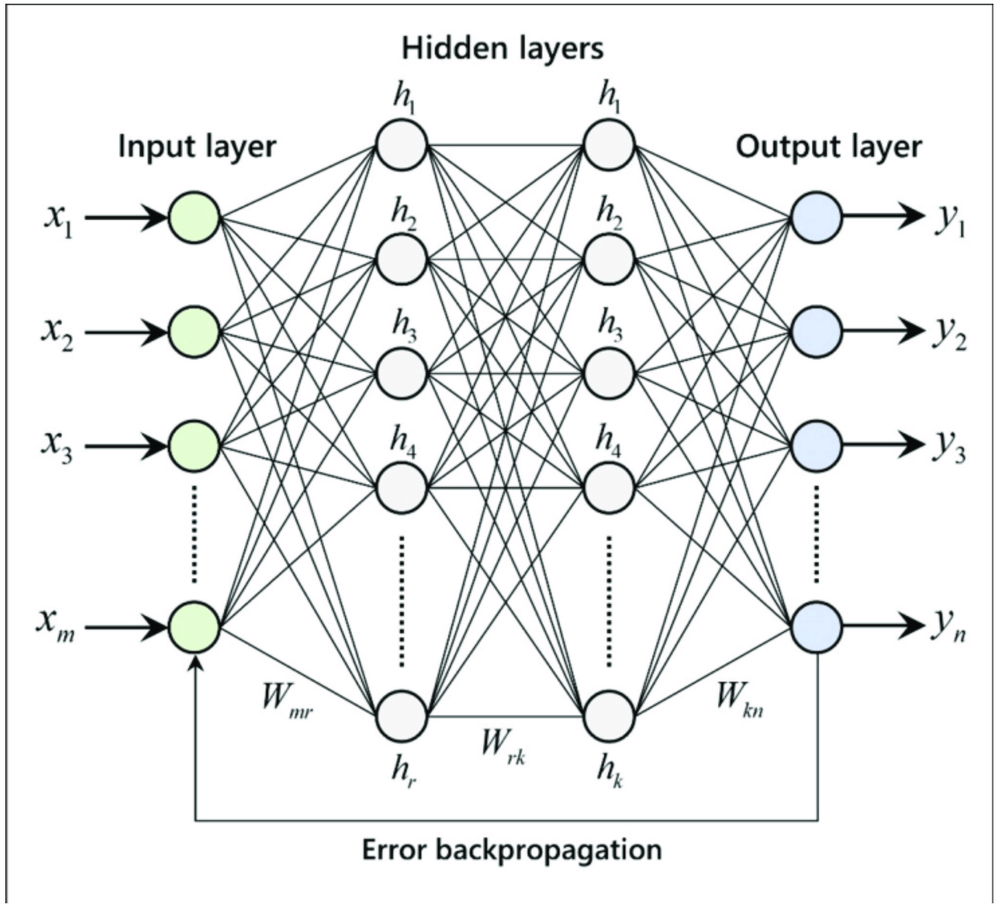
- Deep Learning
  - Low Level Features -> Mid Level Features -> High Level Features -> Trainable classifiers



https://lawtomated.com/a-i-technical-machine-vs-deep-learning/

Multi-Layer Neural Networks

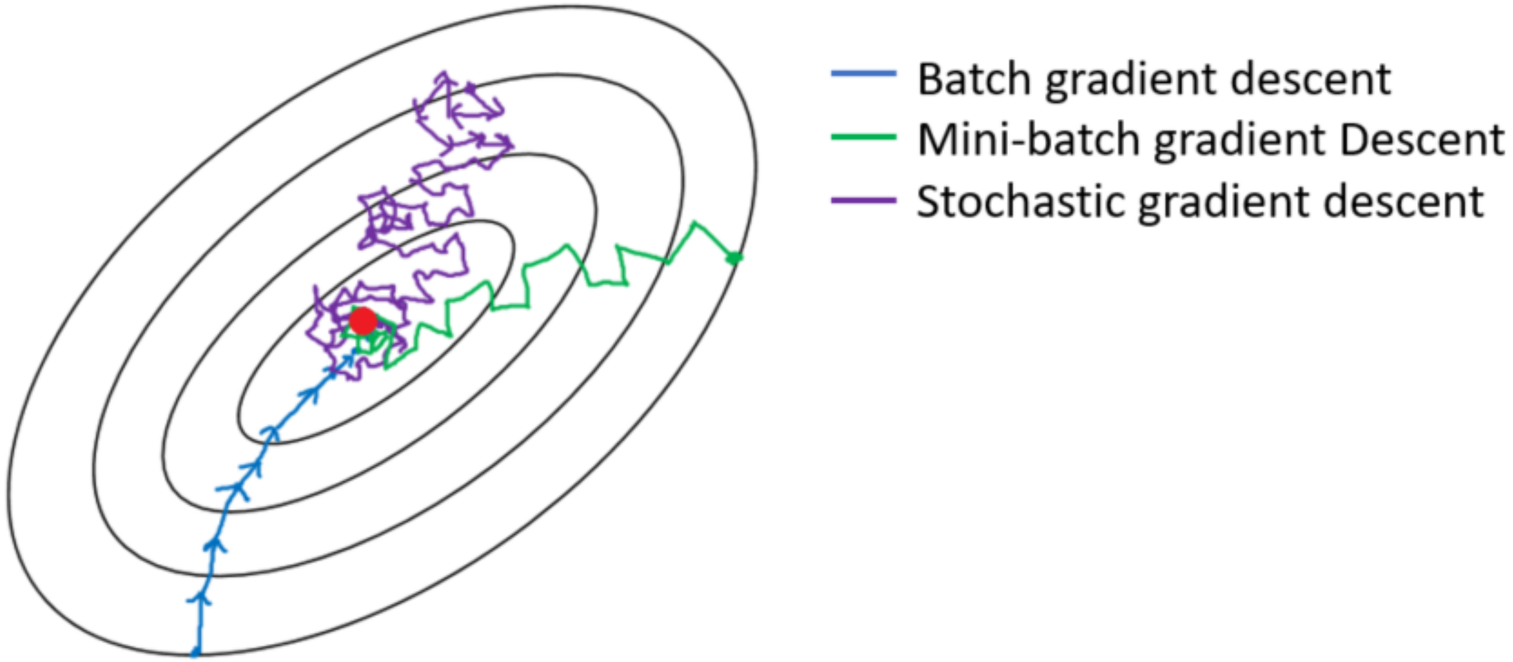
- Multiple Layers of simple units
- Each unit computes a weighted sum of its inputs
- Weighted sum is passes through a non-linear function
  $(ReLU = max(0, x))$
- The learning algorithm changes weights



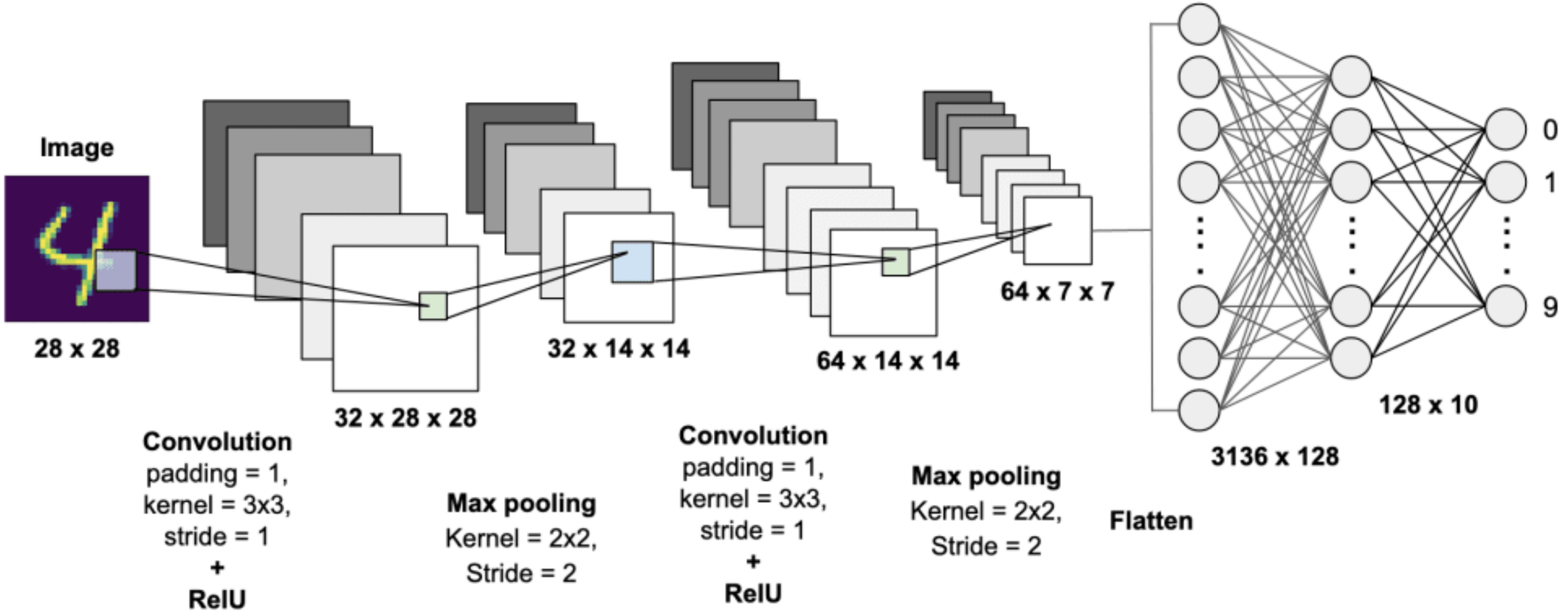
https://www.researchgate.net/figure/Architecture-of-multilayer-artificial-neural-network-with-error-backpropagation_fig3_329216193

Function Optimization

- Stochastic Gradient Descent
- $$W_i \leftarrow W_i - \alpha \frac{\delta L(W, X}{\delta W_i}$$
- Computing Gradients by Back-Propogation



Convolutional Neural Network



https://dev.to/afrozchakure/cnn-in-a-brief-27gg

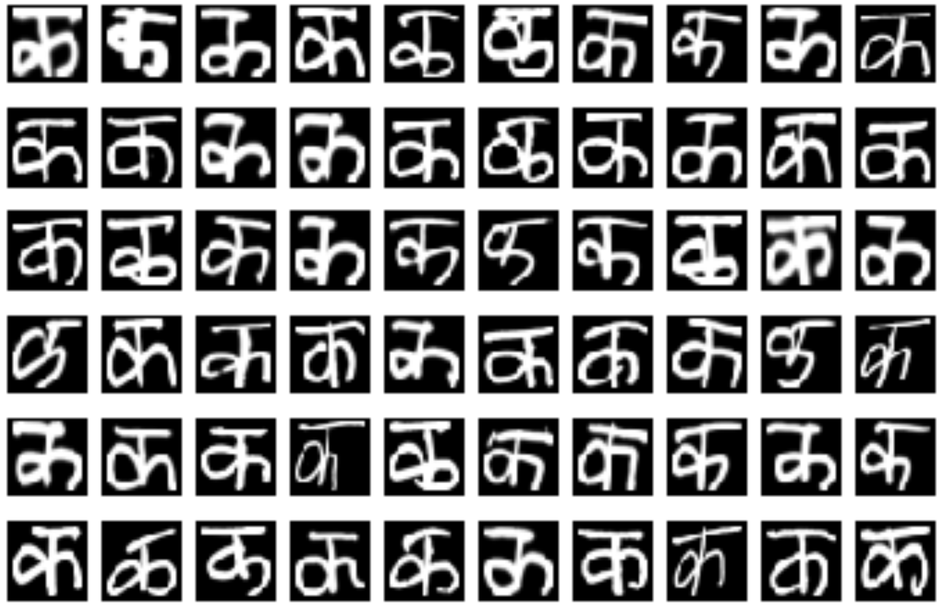
Transfer Learning using CNN for Handwritten Devanagari Character Recognition

Published in IEEE International Conference on Advances in Information Technology (ICAIT), 2019

https://ieeexplore.ieee.org/document/8987286

Transfer Learning using CNN for Handwritten Devanagari Character Recognition

Dataset



Transfer Learning using CNN for Handwritten Devanagari Character Recognition

Results

Model	Valid Accuracy (in 1st epoch)	Best Accuracy (in 15 epochs)	Best Accuracy acheiveed in # epochs	Total Time (15 epochs)	Average Training Time per Epoch
AlexNet	95	98	3	33m 8s	2.2m
DenseNet 121	73	89	7	80m 3s	5.3m
DenseNet 201	74	90	6	113m 22s	7.6m
Vgg 11	97	99	8	86m 6s	5.7m
Vgg 16	97	98	3	132m 12s	8.8m
Vgg 19	96	98	3	148m 57s	9.9m
Inception V3	99	99	1	244m 36s	16.3m

Detecting Fake News with Machine Learning

Published in International Conference on Deep Learning, Artificial Intelligence and Robotics, (ICDLAIR), 2021

https://link.springer.com/chapter/10.1007/978-3-030-67187-7_7

Detecting Fake News with Machine Learning

Dataset and Features

- Kaggle dataset of Fake news
- Real news from Guardian website
- Features - 43
  - 39 Parts of Speech Features
  - 3 Sentiment Analysis
    - Positive Words, Negative Words, Neutral Words
  - Unique Words

Detecting Fake News with Machine Learning

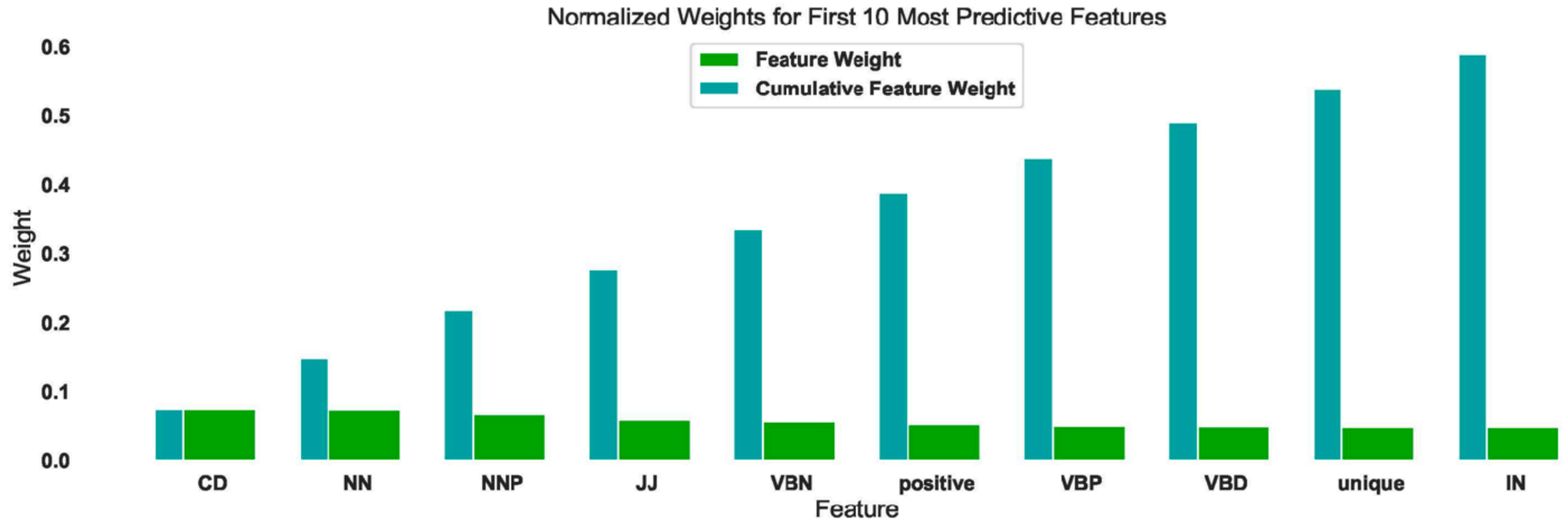
Algorithm

- Ada Boost Classifier
- Decision Trees Classifier
- Gaussian Naive Bayes (GaussianNB)
- K-Nearest Neighbors (KNeighbors)
- Stochastic Gradient Descent Classifier (SGDC)
- Support Vector Machine

Detecting Fake News with Machine Learning

Results

- AdaBoost Classifier with base estimator as Decision Tree of maximum depth 3
- Features NN (noun, common, singular or mass); CD (numeral, cardinal); VBP (verb, present tense, not 3rd person singular); VBG(verb, present participle or gerund); positive (positive sentiment); NNP(noun, proper, singular); JJ(adjective or numeral, ordinal); IN(preposition or conjunction, subordinating); VBN(verb, past participle); and unique (unique words) were found top predictive features that provided accuracy of 0.85 and F-score of 0.87



Neural Machine Translation model for University Email Application

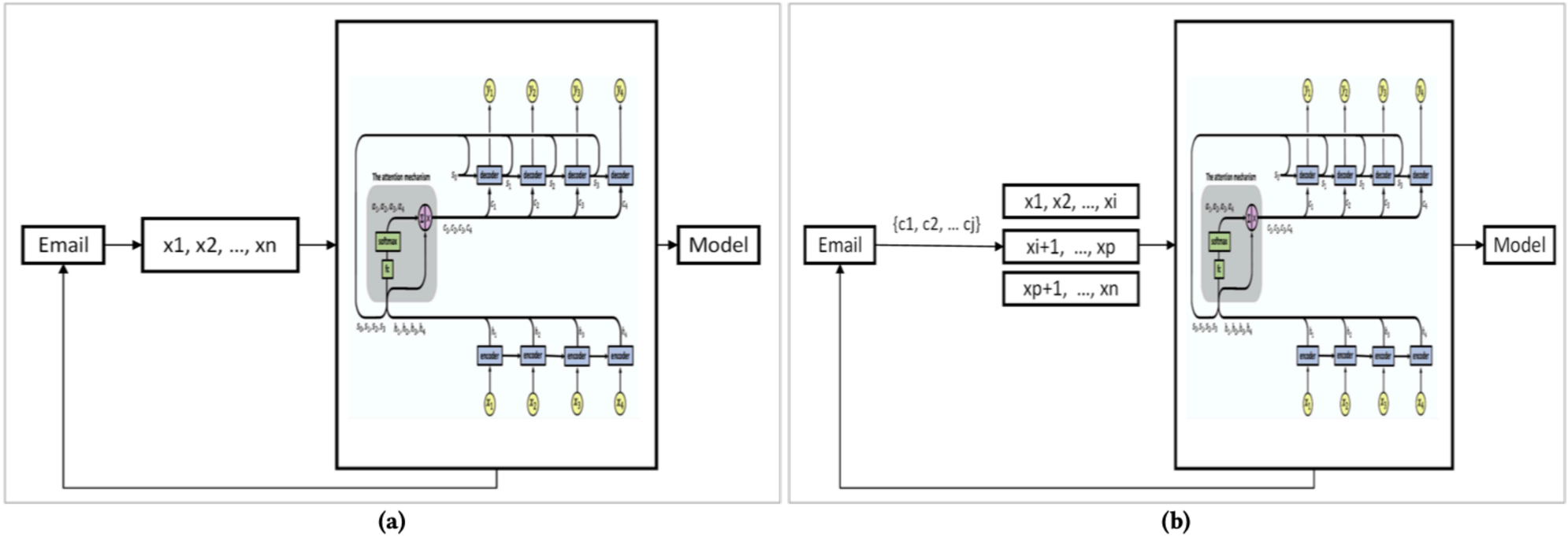
International Conference on Natural Language Processing (ICNLP), 2020

https://dl.acm.org/doi/fullHtml/10.1145/3421515.3421522

Neural Machine Translation model for University Email Application

Dataset and Methodology

- Email communication
- Contextual Paragraph Level Selection



Neural Machine Translation model for University Email Application

Results

- LSTM with Attention mechanism using Contextual Paragraphs
  - English -> Malay: 0.95
  - Malay -> English: 0.93
- Google
  - English -> Malay: 0.75
  - Malay -> English: 0.735

Thank you

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