Natural Language Processing with Python

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Bag of Words

Sentence 1 : I like learn programming

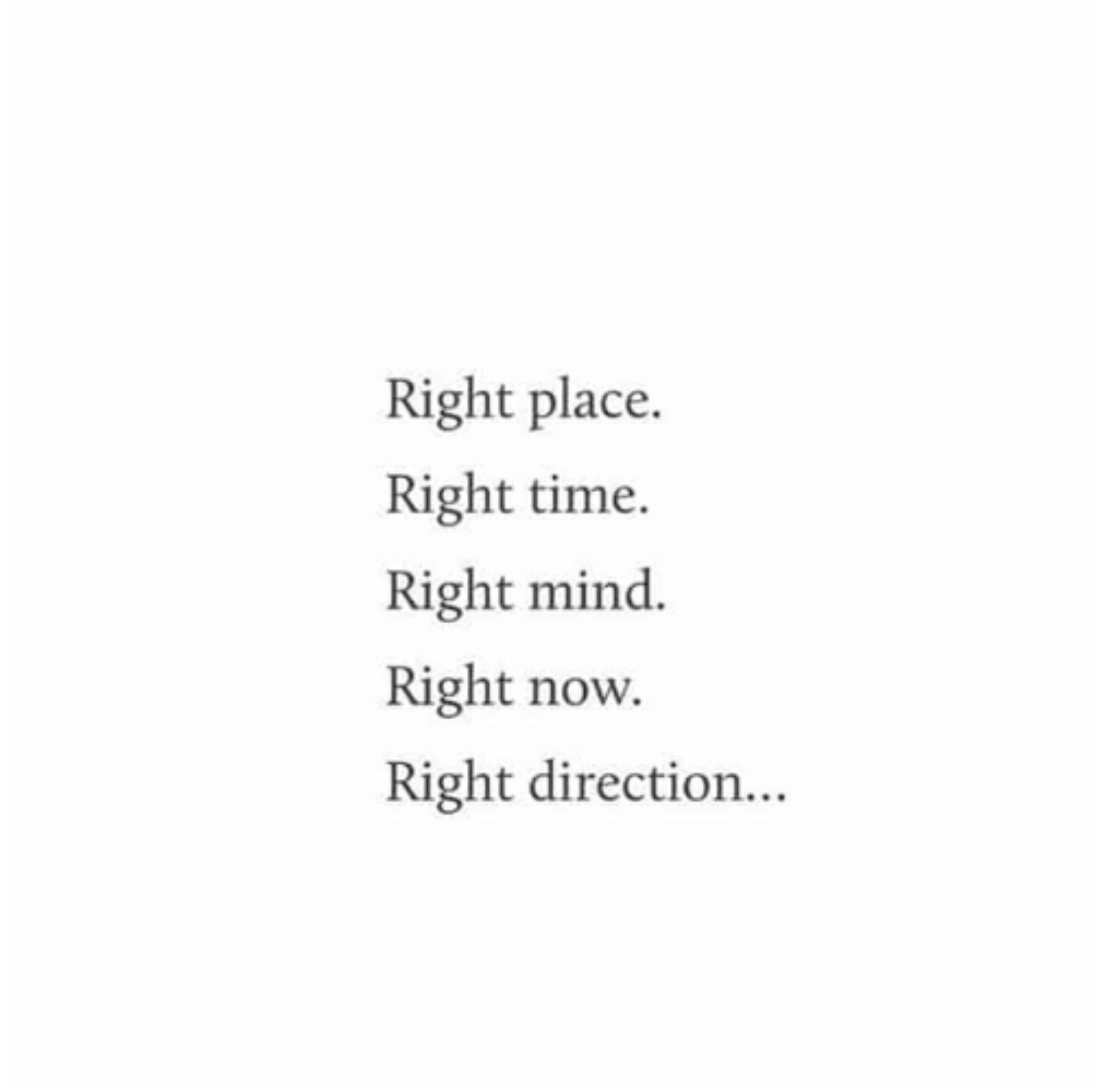
Sentence 2 : I hate learn programming

Sentence 3 : I like learn programming and design

	I	like	hate	learn	programming	and	design
Sen 1	1	1		1	1		
Sen 2	1		1	1	1		
Sen 3	1	1		1		1	1

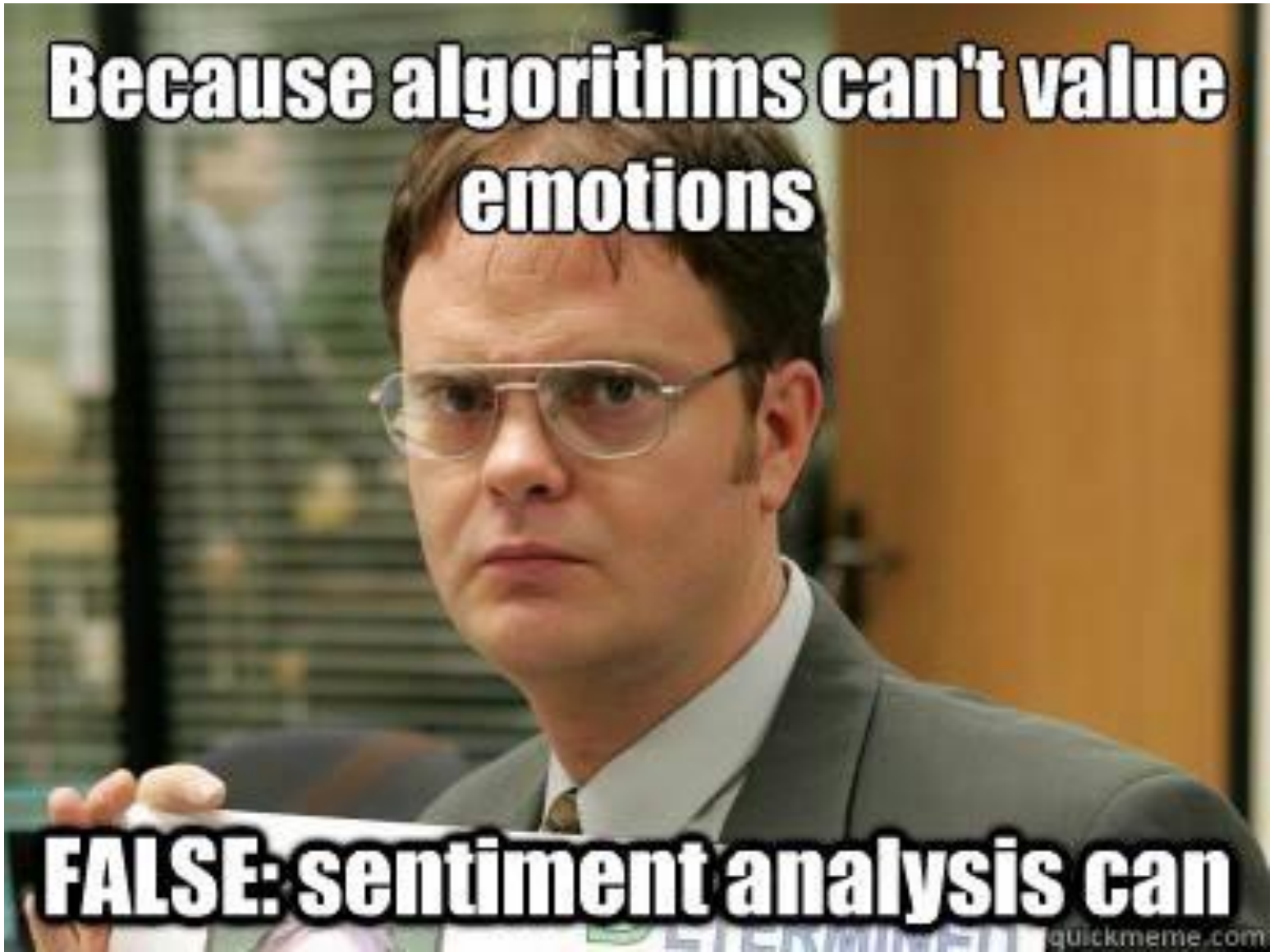
Tahukah Anda?

Mendoakan orang mati maka
Kita akan mendapat dosa

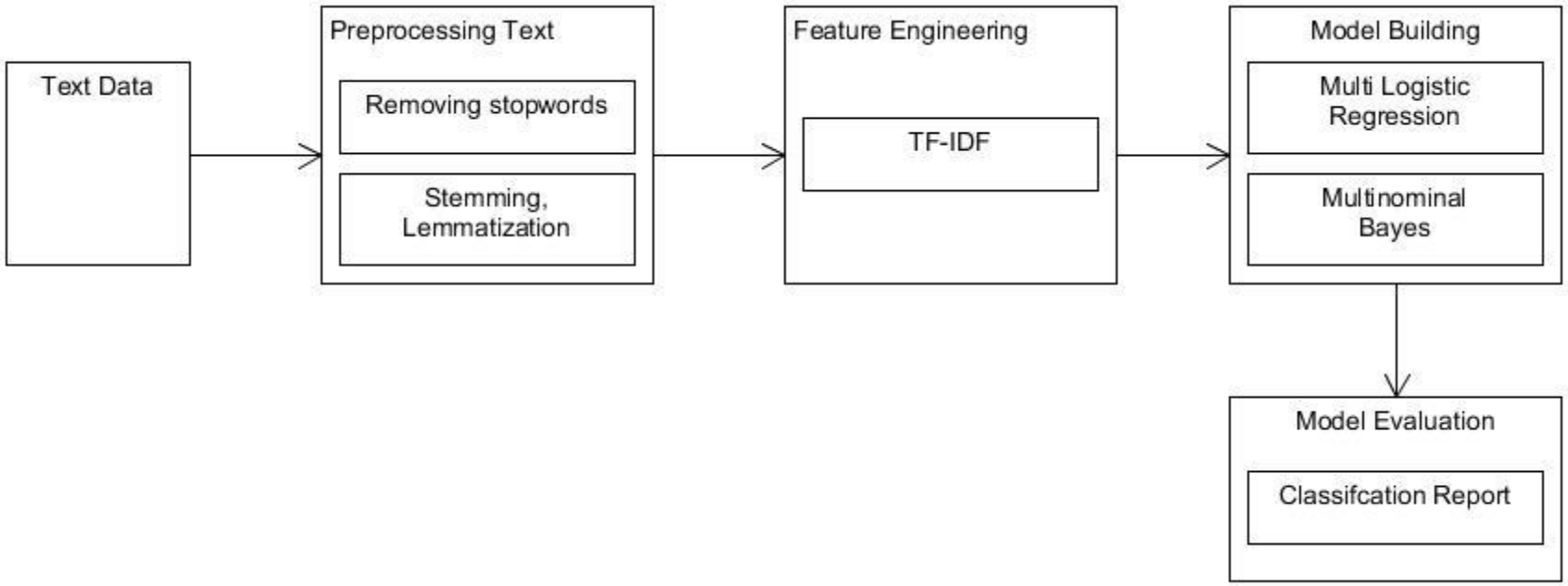


👌 https://t.co/UAX656VMRY

Sentiment Analysis



Sentiment Analysis WorkFlow



Feature Engineering

TF-IDF

Term Frequency (TF)

A method to count the weight of word that used in a text / sentence.

$$tf = \begin{cases} 1 + log_{10}(f_{t_1 d}), & f_{t_1 d} > 0 \\ 0, & f_{t_1 d} = 0 \end{cases}$$

Inverse Document Frequency (IDF)

How term distributed widely in document.

$$IDF_j = \log \frac{D}{df_1}$$

So, what is TF-IDF?

TF-IDF

A method to count the weight of word that used in a text / sentence and term distributed widely in document.

$$w_{ij} = tf_{ij} \times idf_j$$

$$w_{ij} = tf_{ij} \times \log \frac{D}{df_j}$$

If D = df_j which can causes 0, so add 1 in IDF equation.

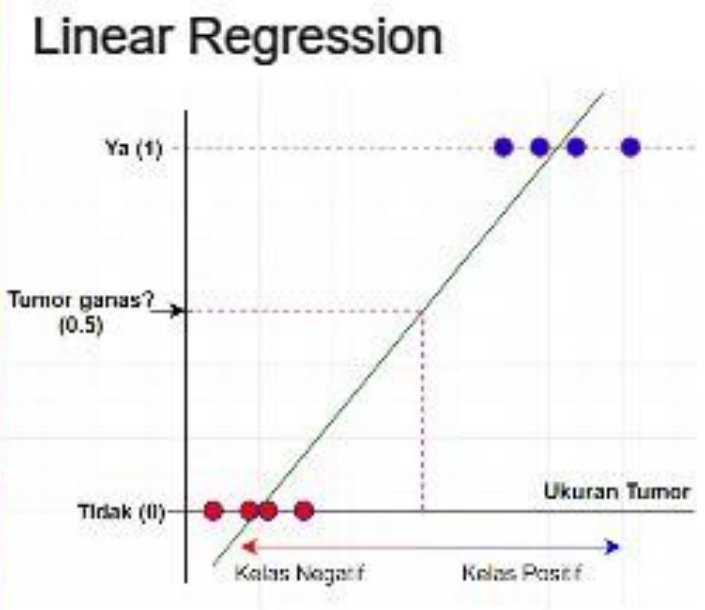
$$w_{ij} = tf_{ij} \times \log \frac{D}{df_j} + 1$$

Multinominal Logistic Regression

Linear Regression

- The output is prediction.
- The output of data type usually continuous.

$$y = b_0 x + b_1$$


Linear Regression
Ya (1)
Tumor ganas?
(0.5)
Tidak (0)
Ukuran Tumor
Kelas Negatif
Kelas Positif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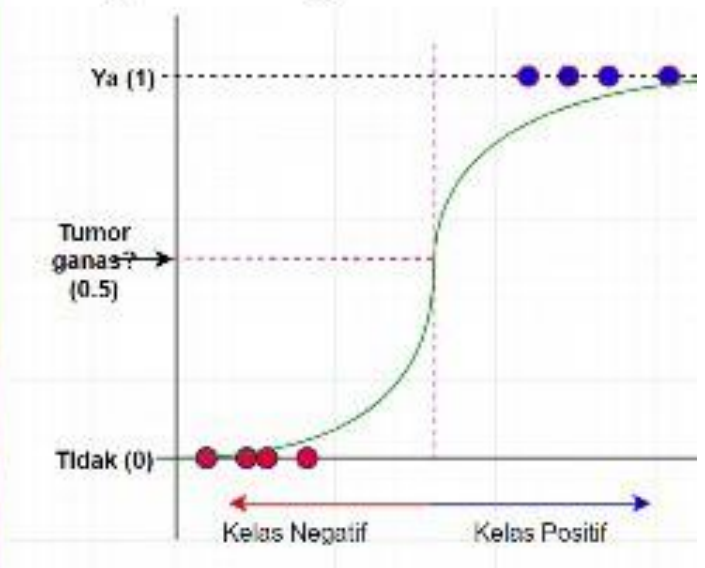

Logistic Regression
Ya (1)
Tumor
ganas?
(0.5)
Tidak (0)
Kelas Negatif
Kelas Positif

Logistic Regression

- The output is classification.
- The output of data type usually discrete variable.
- For multinominal logistic regression, it’s used for multi class classification. Logistic regression used for binary classification.

$$y = b_0 x + b_1$$

$$f(x) = \frac{1}{1 + e^{-y}} = \frac{1}{1 + e^{-(b_0 x + b_1)}}$$

LINEAR FUNCTION

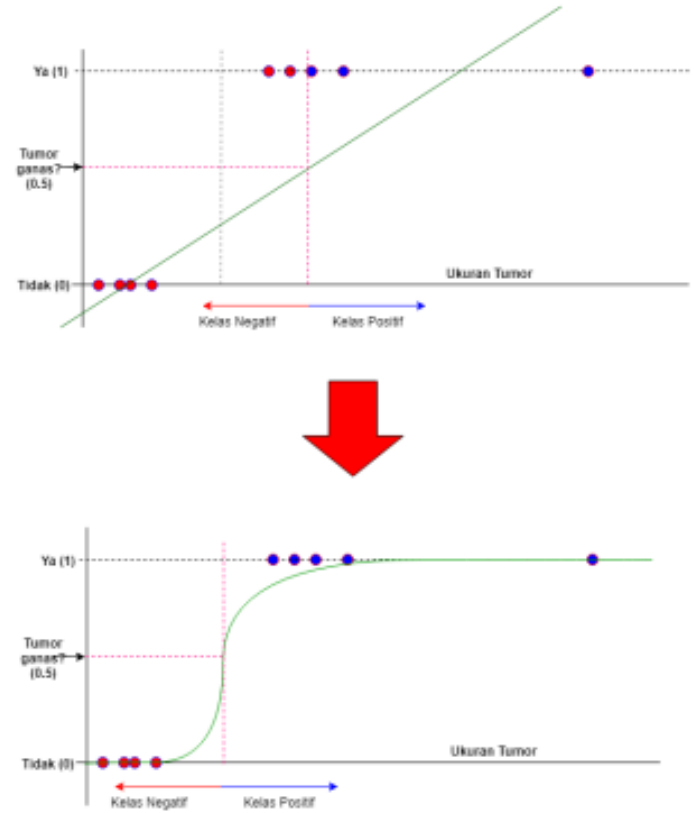
$$Y = b_0 + b_1 * X$$

SIGMOID FUNCTION

$$P = \frac{1}{1 + e^{-Y}}$$

LOGISTIC FUNCTION

$$P = \frac{1}{1 + e^{-(b0 + b1 * X)}}$$



Multinominal Bayes

Naive Bayes

- The output is classifcation.
- The output of data type usually discrete.
- For multinominal, it’s for multi-class classification.

$$P(L|features) = \frac{P(features|L)P(L)}{P(features)}$$

If you want to predict more than 2 labels:

$$\frac{P(L_1|features)}{(L_2|features)} = \frac{P(L_1|features)P(L_1)}{P(L_2|features)P(L_2)}$$

Let’s code