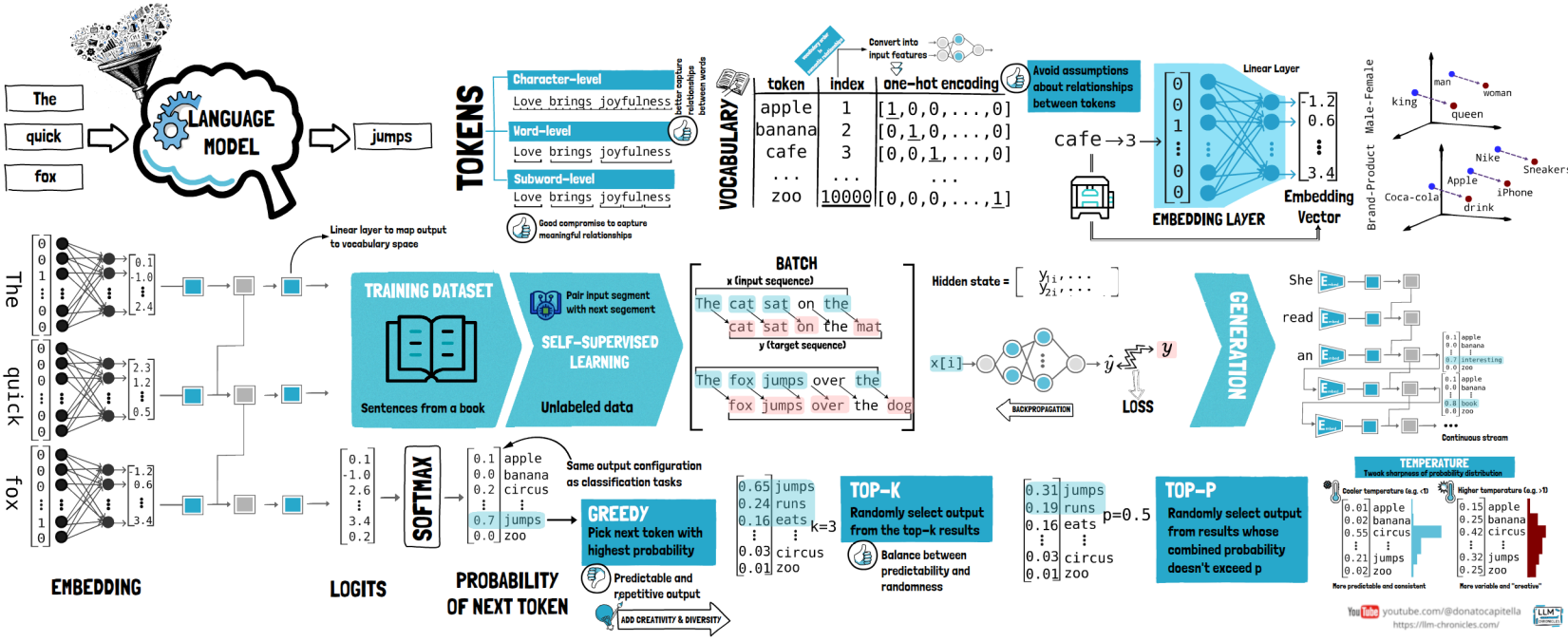
The
quick
fox
LANGUAGE MODEL
jumps
TOKENS
Character-level
Love brings joyfulness
Better capture relationships between words
Word-level
Love brings joyfulness
Subword-level
Love brings joyfulness
Good compromise to capture meaningful relationships
VOCABULARY
Convert into input features
token
index
one-hot encoding
apple 1 [1,0,0,...,0]
banana 2 [0,1,0,...,0]
cafe 3 [0,0,1,...,0]
... ...
zoo 10000 [0,0,0,...,1]
Avoid assumptions about relationships between tokens
cafe → 3
Linear Layer
EMBEDDING LAYER
Embedding Vector
Brand-Product
Male-Female
man
woman
king
queen
Nike
Sneakers
Apple
iPhone
Coca-cola
drink
Linear layer to map output to vocabulary space
TRAINING DATASET
Sentences from a book
Pair input segment with next segement
SELF-SUPERVISED LEARNING
Unlabeled data
BATCH
x (input sequence)
The cat sat on the
cat sat on the mat
y (target sequence)
The fox jumps over the
fox jumps over the dog
Hidden state =
x[i]
ŷ
y
BACKPROPAGATION
LOSS
GENERATION
She
read
an
Continuous stream
EMBEDDING
LOGITS
SOFTMAX
PROBABILITY OF NEXT TOKEN
Same output configuration as classification tasks
GREEDY
Pick next token with highest probability
Predictable and repetitive output
ADD CREATIVITY & DIVERSITY
k=3
TOP-K
Randomly select output from the top-k results
Balance between predictability and randomness
p=0.5
TOP-P
Randomly select output from results whose combined probability doesn't exceed p
TENPERATURE
Tweak sharpness of probability distribution
Cooler temperature (e.g. <1)
Higher temperature (e.g. >1)
More predictable and consistent
More variable and "creative"
youtube.com/@donatocapitella
https://llm-chronicles.com/