Music Generation By AI

1155144407 Kwok Lam Him

1155141911 Kwok Chun Kiu

Background

- Does AI have creativity?
  - What is GPT?

GPT Example

- Code generation (GitHub Copilot)
- Text generation (Longer than LSTM / RNN)
- Translation (Interlanguage / language to command)

GPT[1]

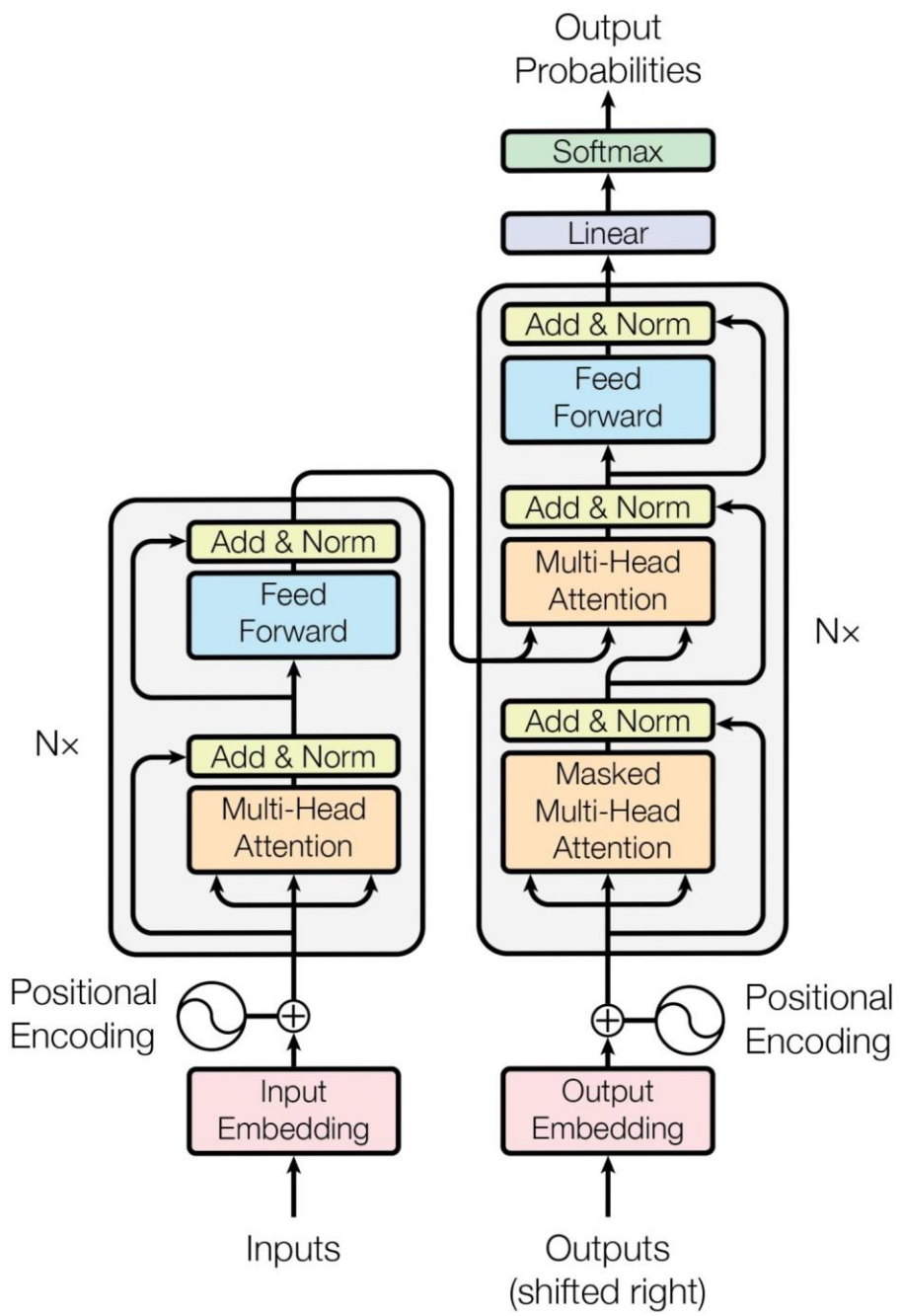
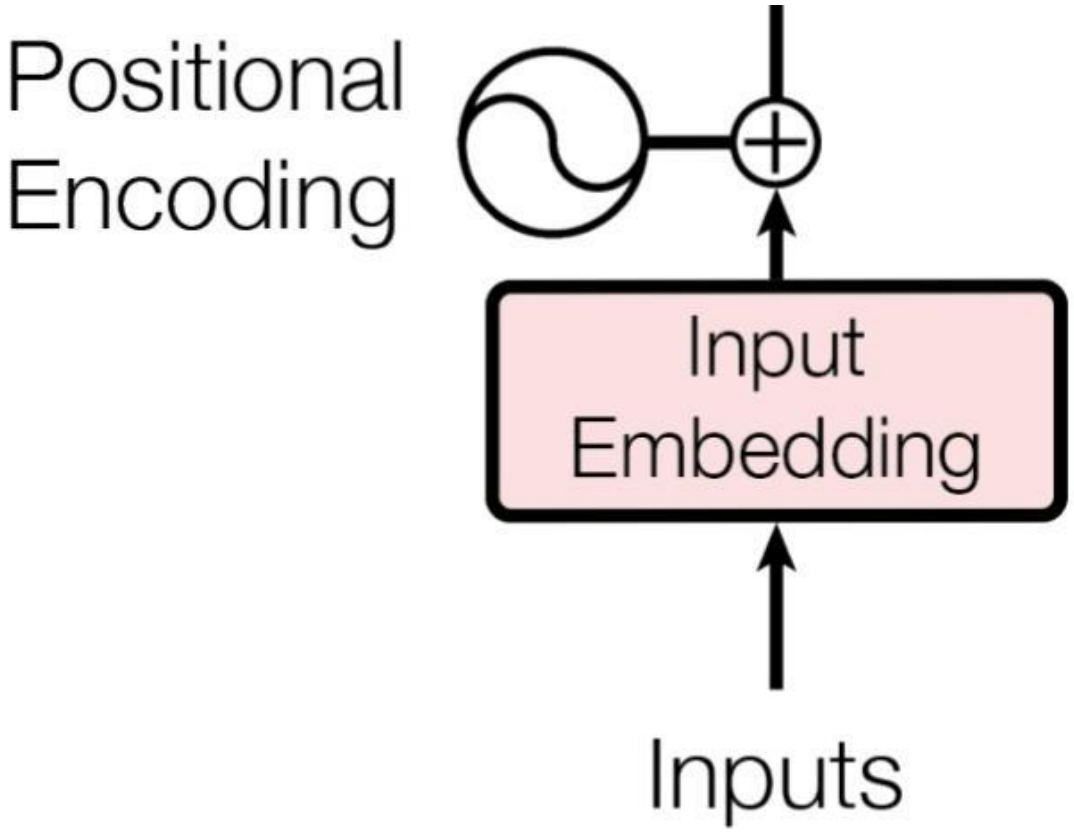
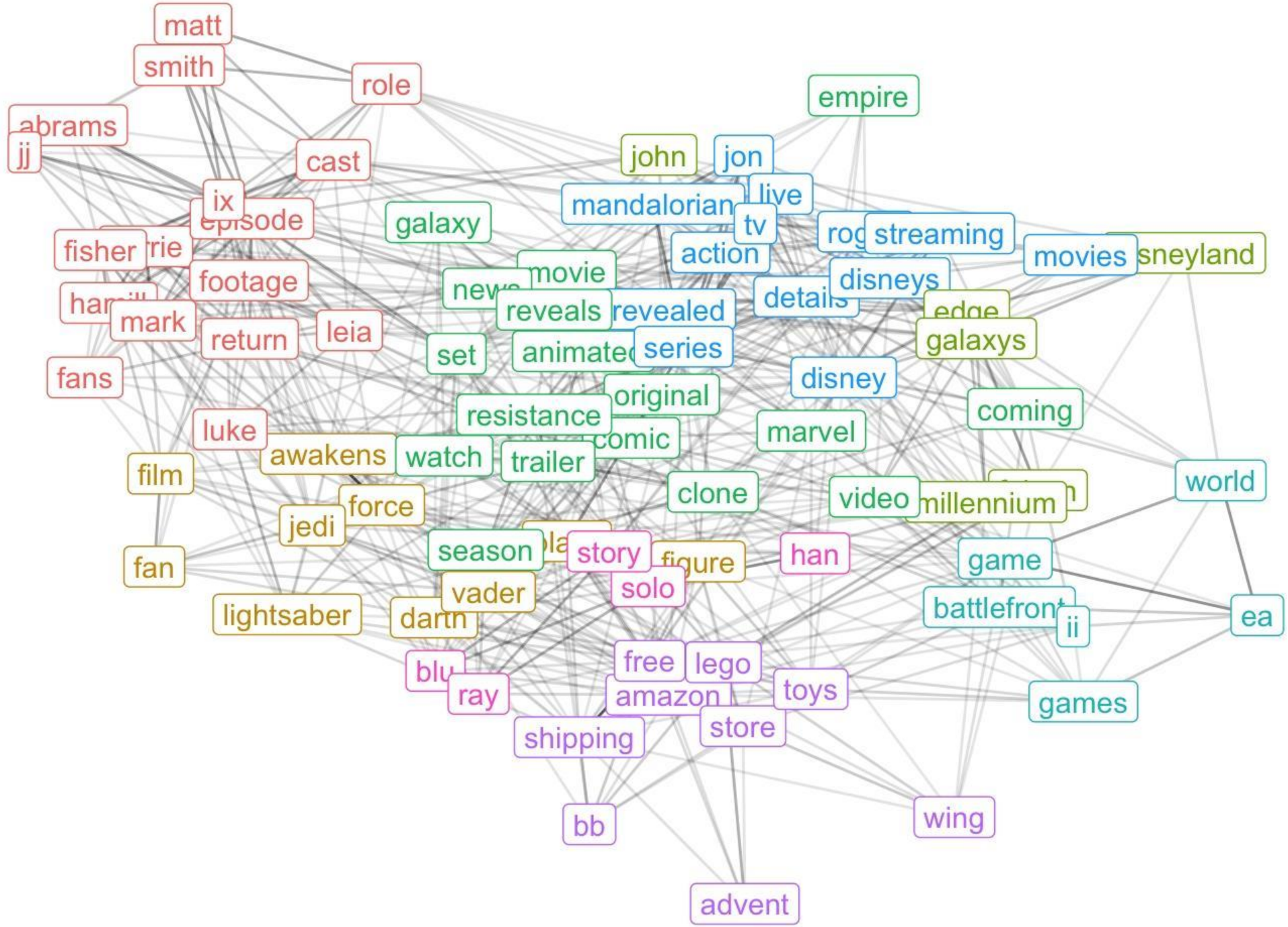
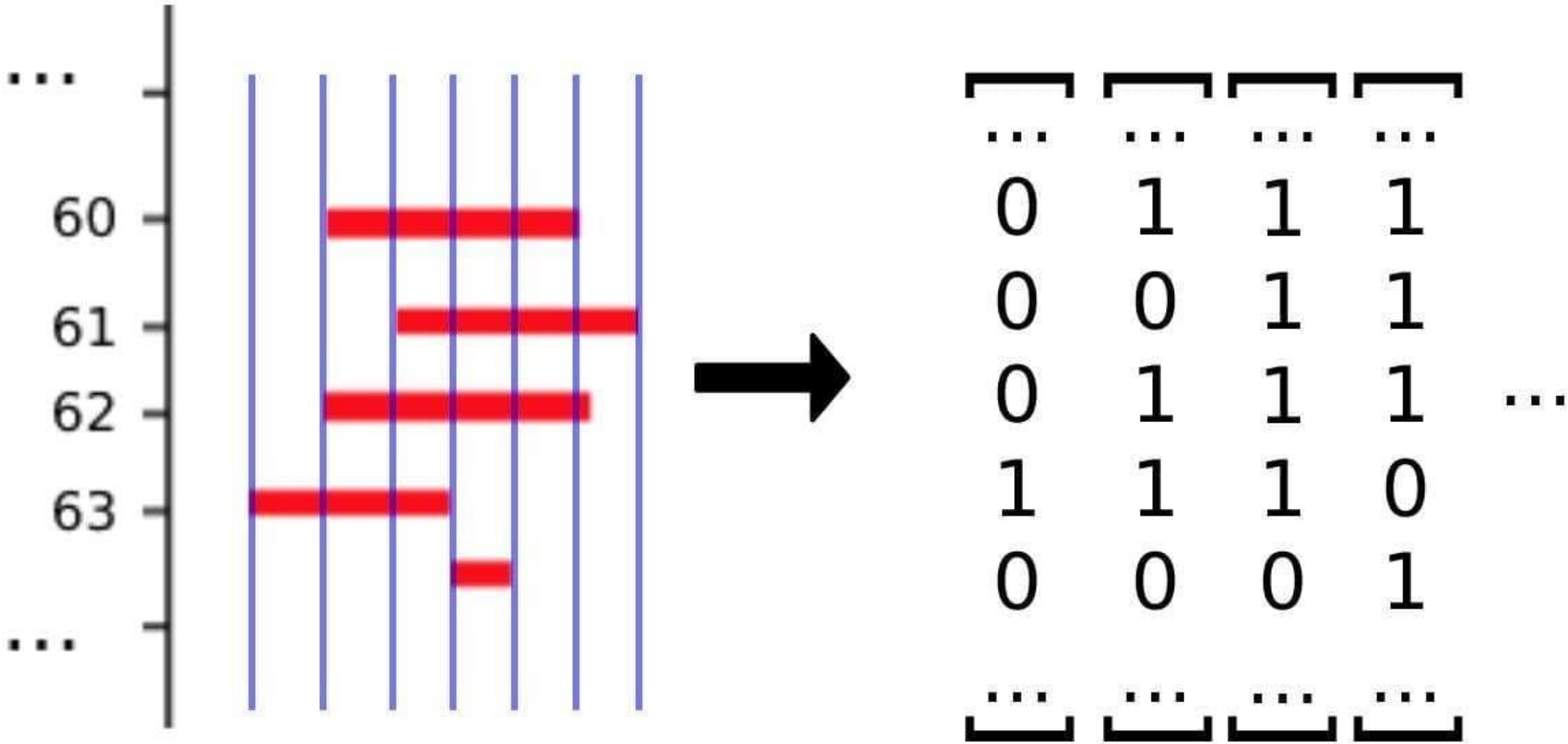


Figure 1: The Transformer - model architecture.

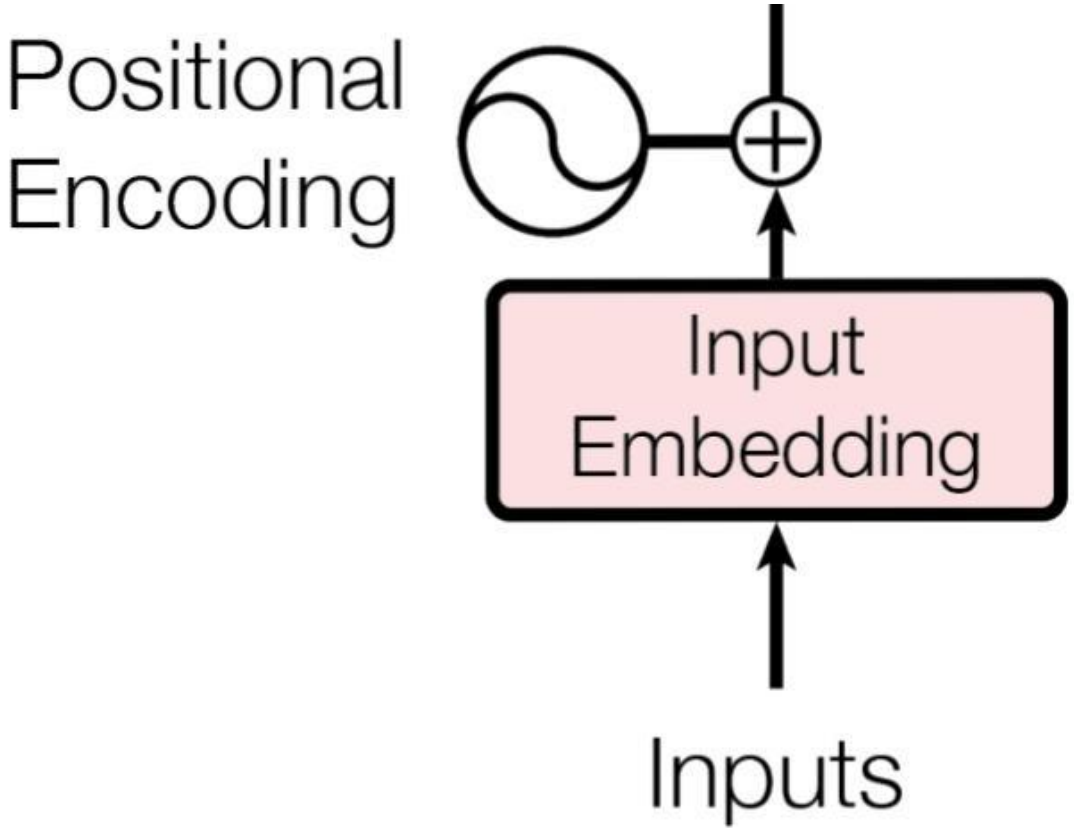
Input Embedding:
Word to vector in a dictionary




matt
smith
role
abrams
jj
cast
empire
john
jon
live
mandalorian
tv
ix
episode
galaxy
fisher
rie
action
streaming
movies
sneyland
movie
footage
disneys
details
reveals
revealed
mark
return
leia
set
animated
series
galaxys
fans
disney
original
resistance
coming
luke
comic
marvel
awakens
watch
trailer
film
clone
video
millennium
world
force
jedi
season
story
figure
han
game
fan
vader
solo
battlefront
lightsaber
darth
ii
ea
free
lego
blu
ray
amazon
toys
games
shipping
store
bb
wing
advent


...
60
61
62
63
...
...
...
...
...
0 1 1 1
0 0 1 1
0 1 1 1
1 1 1 0
0 0 0 1
...
...
...
...
...

Positional Encoding:
Add positional information

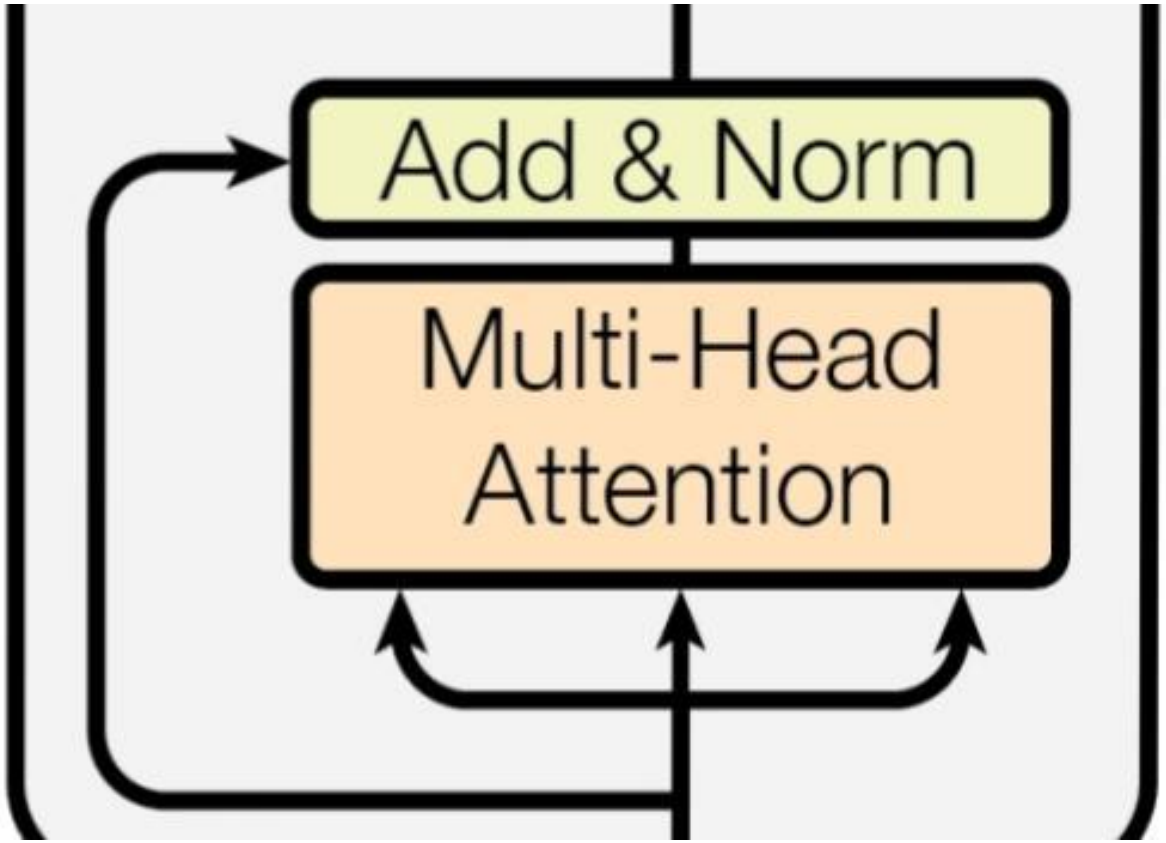


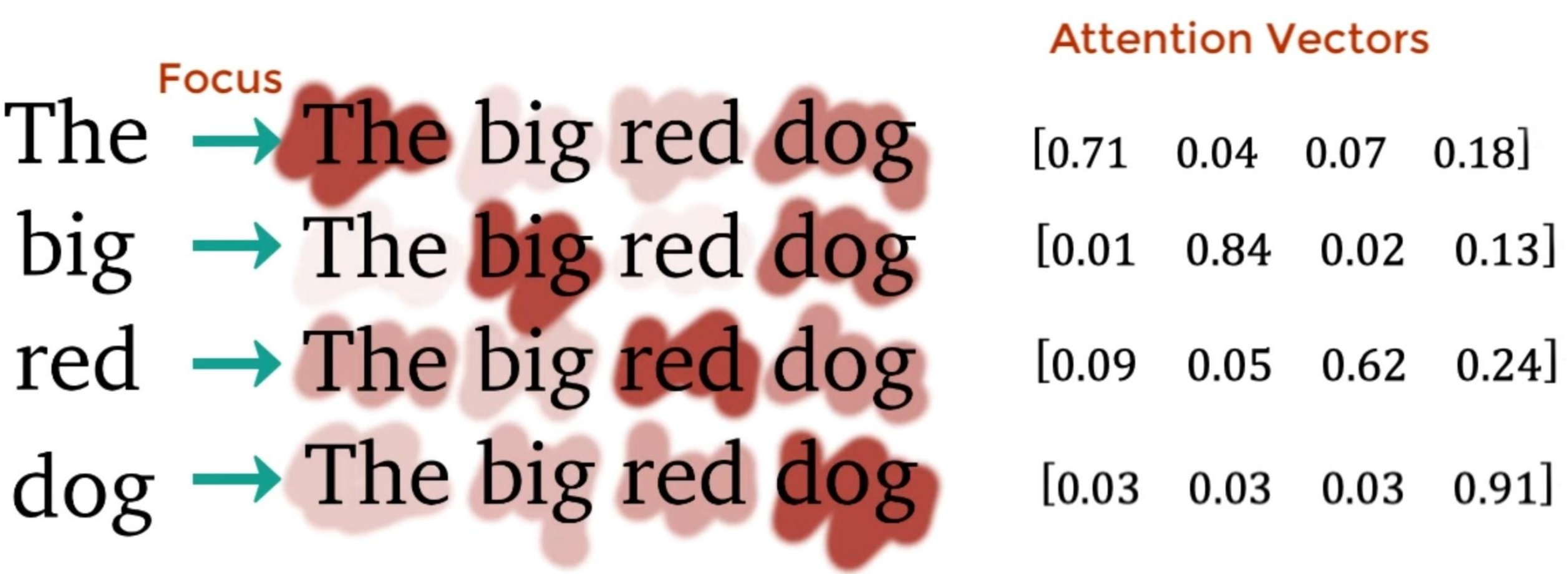
Add positional and syntax information:

John licked his drop of tear. Position 6

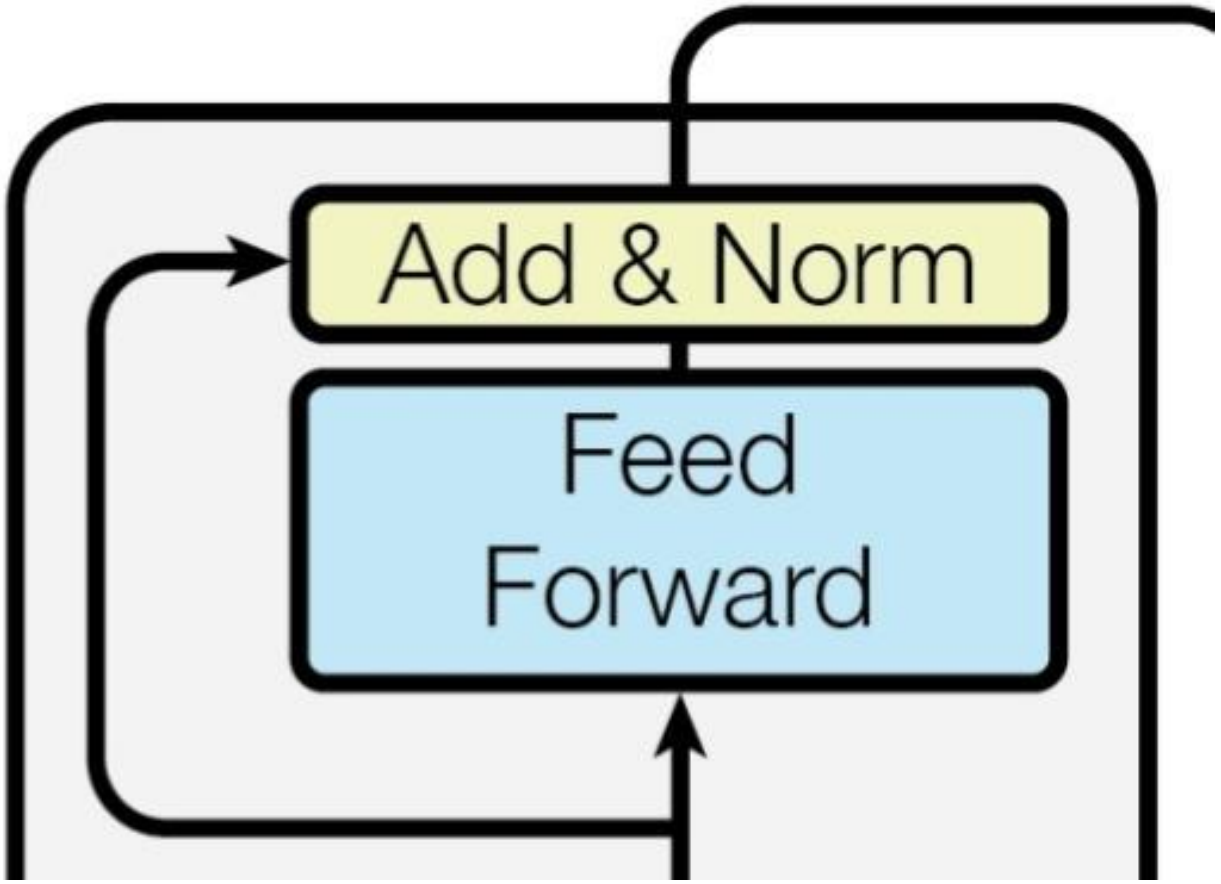
They tear the paper apart. Position 2

Multi-Head Attention:
Compute how much a word is related to every other word




Focus
Attention Vectors
The → The big red dog
[0.71 0.04 0.07 0.18]
big → The big red dog
[0.01 0.84 0.02 0.13]
red → The big red dog
[0.09 0.05 0.62 0.24]
dog → The big red dog
[0.03 0.03 0.03 0.91]

Feed Forward:
Process the vectors for next layer to remove extreme values



GPT[1]

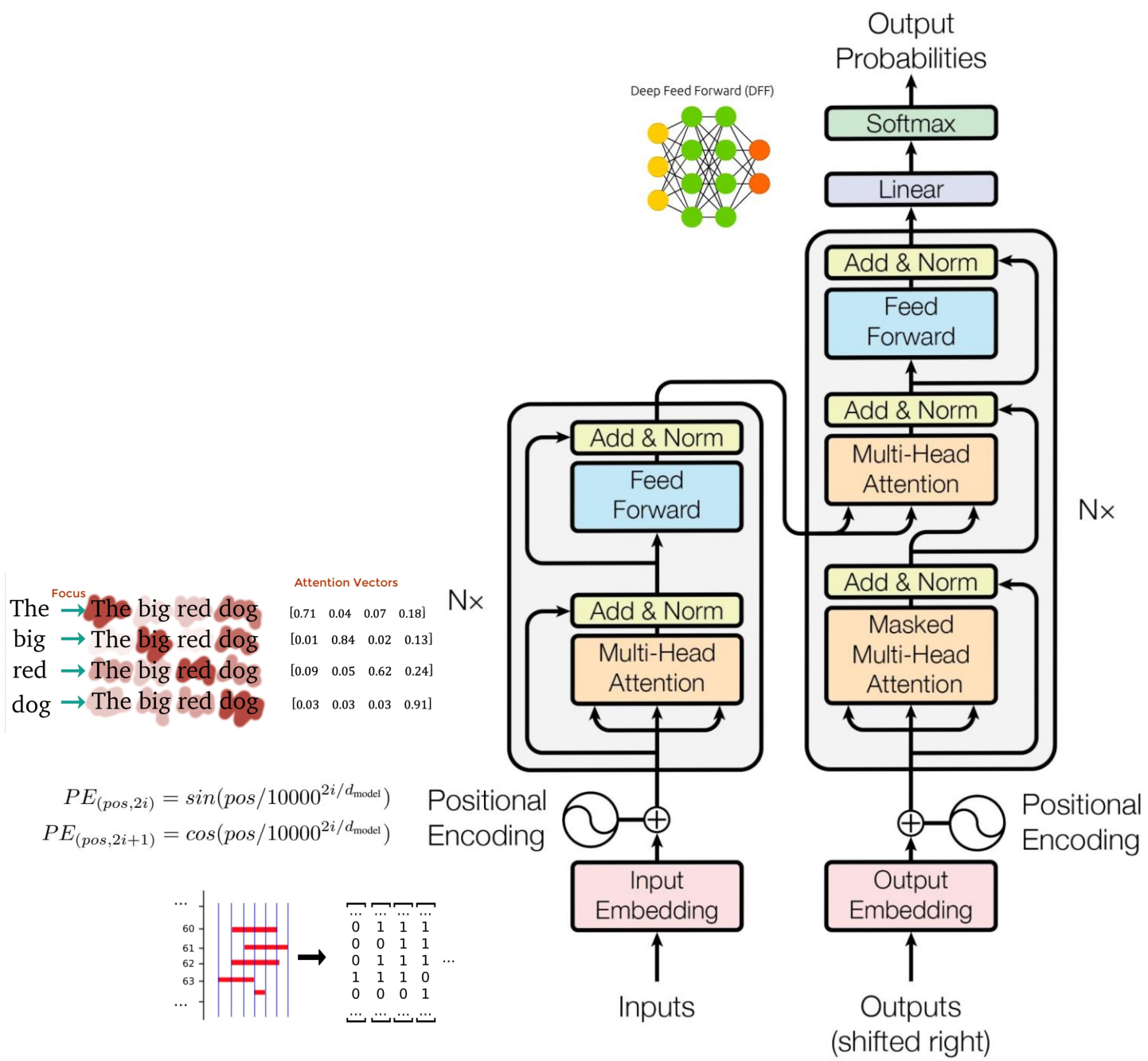


Figure 1: The Transformer - model architecture.

Music is a language

GPT

- Use piano midi sampled every 32^{nd} notes
- Learn how each timestamp of notes is related to one another
- Predict the notes in the next timestamp
- Use previous predictions to be inputs for the current prediction

Failure example (classical music):
a long period of silence

Reasons:
1. Inapropriate data selection
2. The characteristics of classical music
3. Small model
4. Insufficient data