
MLM Fine Tuning

A Multi-Stage Transfer Learning Approach for Personality Classification
Using Masked Language Modeling and Task-Specific Fine-Tuning

FIVE GUYS

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Method

MLM Fine Tuning

Task

MBTI Classification

Transformer

Attention is all you need

Google (2017)

BERT

BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding

Google (2018)

ELECTRA

ELECTRA: Pre-Training Text Encoders as Discriminators rather than Generators

Google Research (2020)

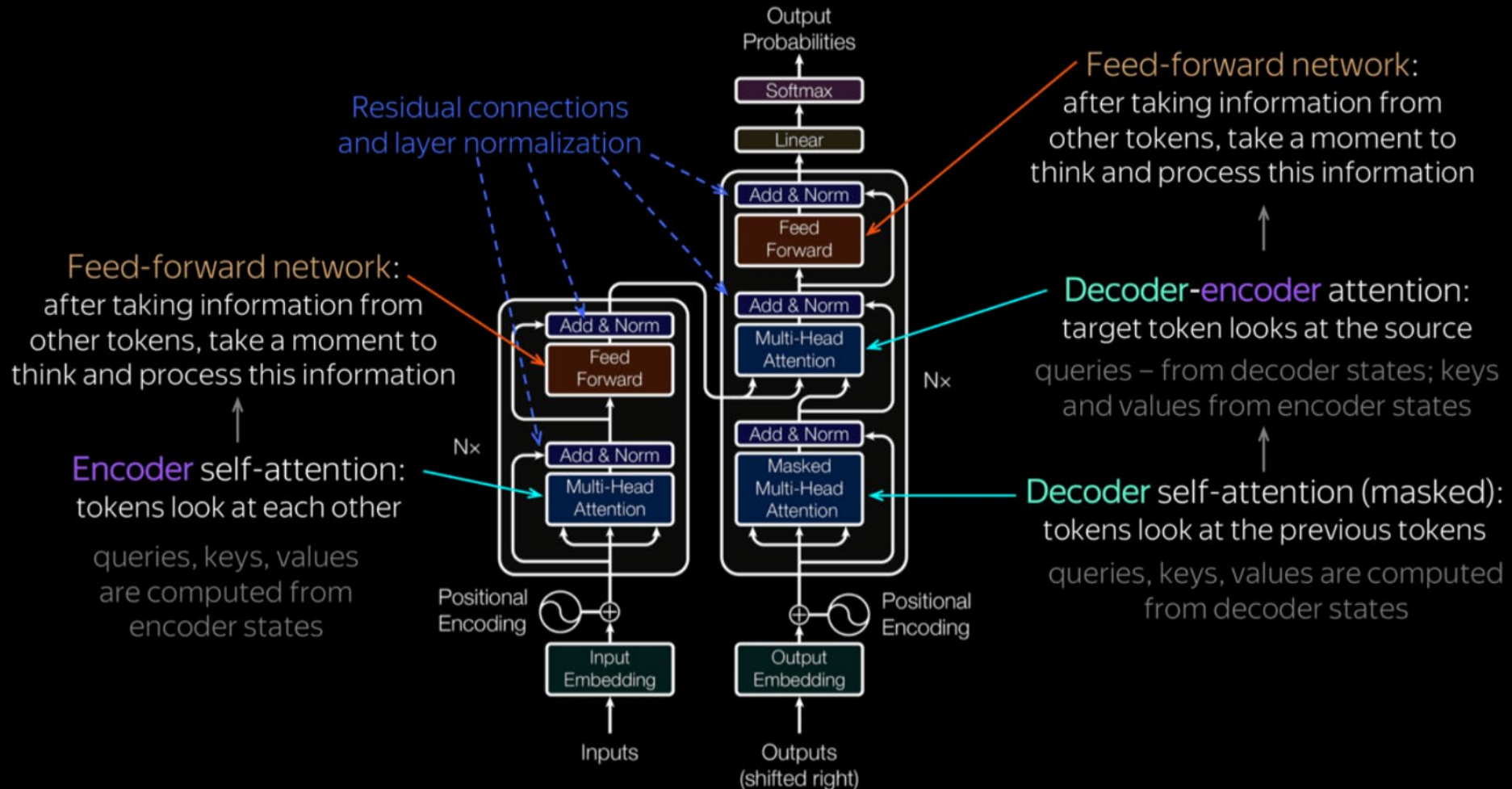
KcELECTRA

KcELECTRA: Korean Comments ELECTRA

Lee Jun Bum (2022)

Transformer

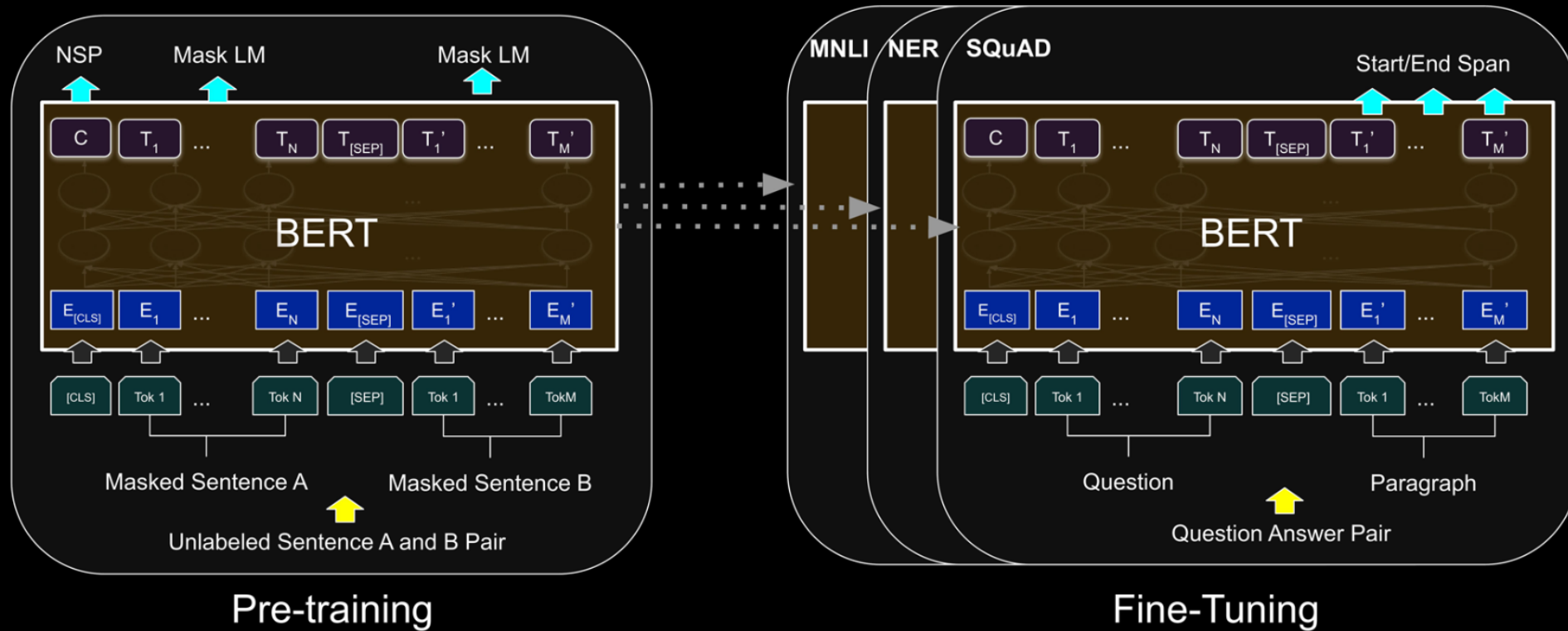
Google (2017) Attention is all you need



BERT

MLM Fine Tuning

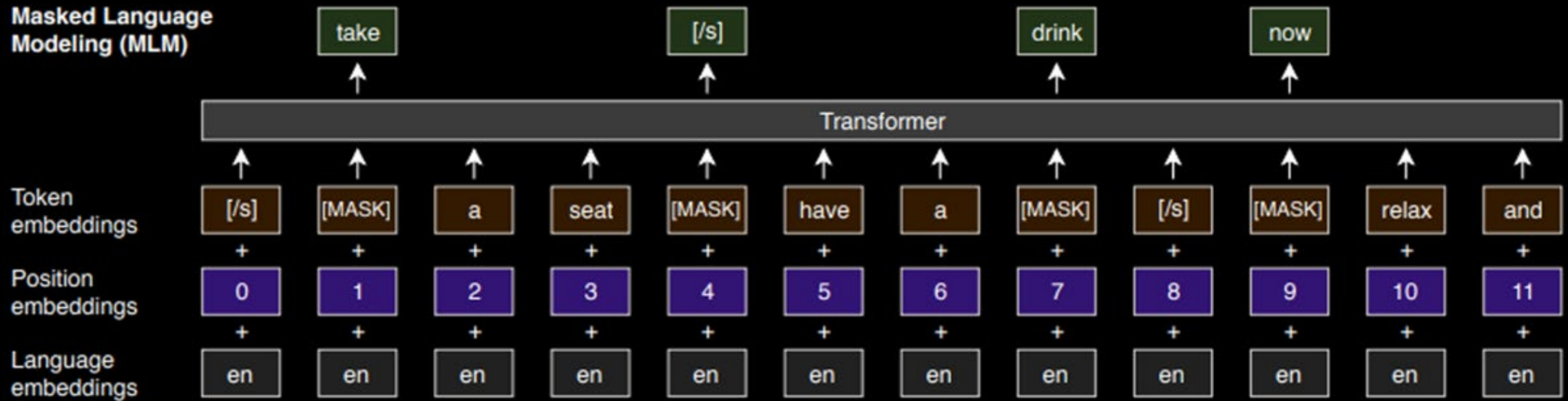
Google (2018) BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding



MLM (Masked Language Model)

NSP (Next Sentence Prediction)

MLM (Masked Language Modeling)



Masking ratio

15 %

MLM in BERT

Masking Rates			Dev Set Results		
MASK	SAME	RND	MNLI Fine-tune	NER Fine-tune	NER Feature-based
80%	10%	10%	84.2	95.4	94.9
100%	0%	0%	84.3	94.9	94.0
80%	0%	20%	84.1	95.2	94.6
80%	20%	0%	84.4	95.2	94.7
0%	20%	80%	83.7	94.8	94.6
0%	0%	100%	83.6	94.9	94.6

Masking ratio

15 %

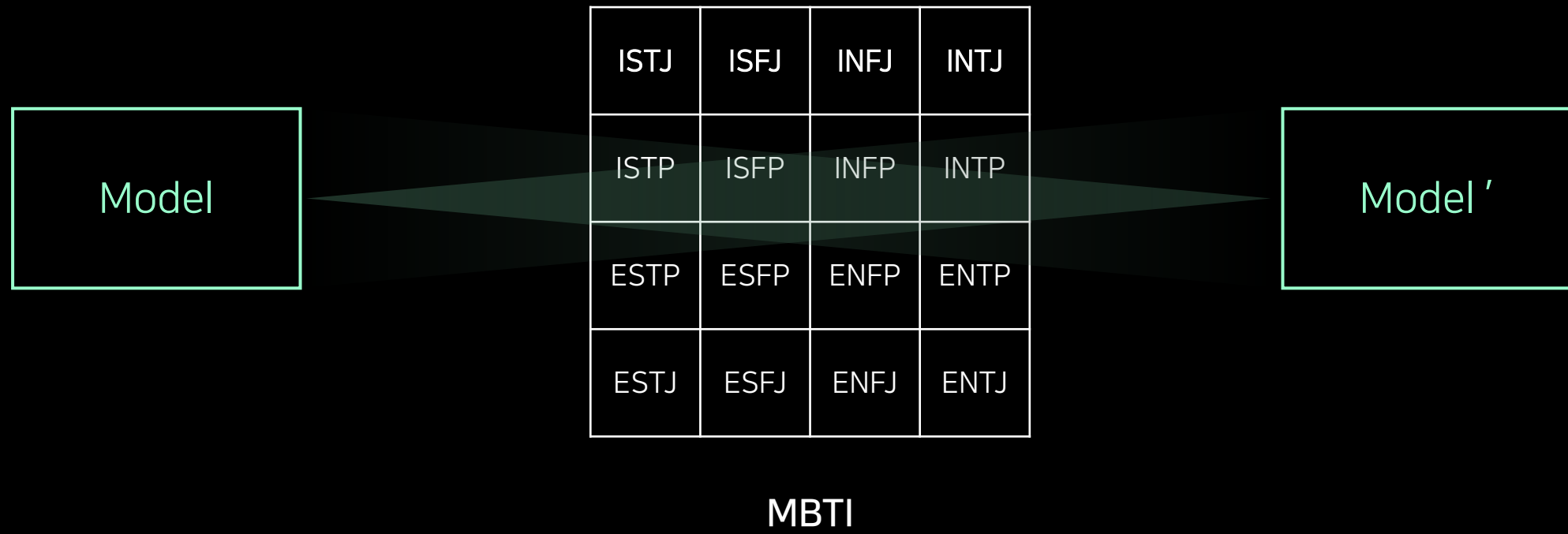
MASK (80%) my dog is hairy → my dog is [MASK]

RND (10%) my dog is hairy → my dog is apple

SAME (10%) my dog is hairy → my dog is hairy

Domain Specific MLM

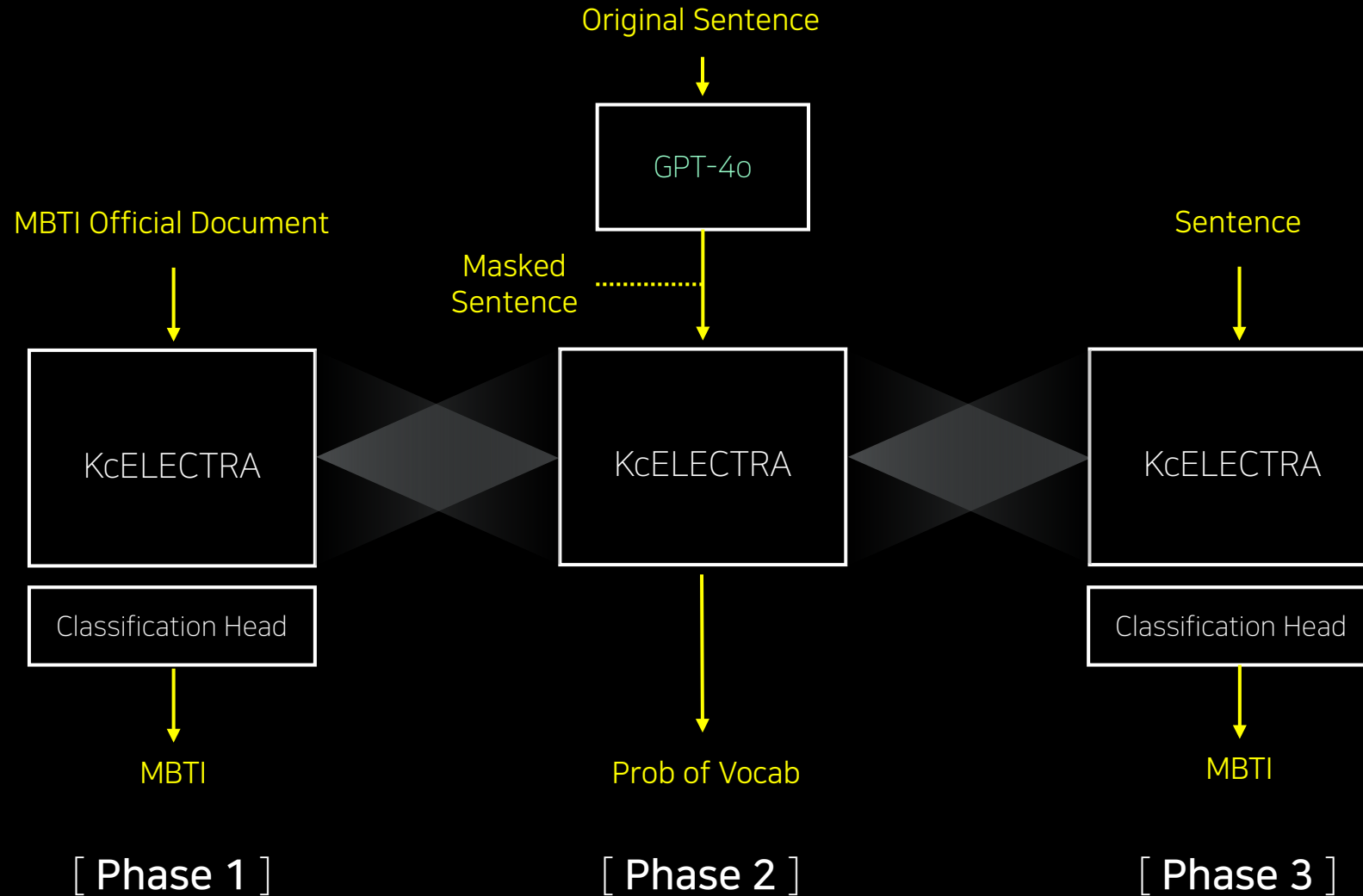
I went to [MASK] after lunch

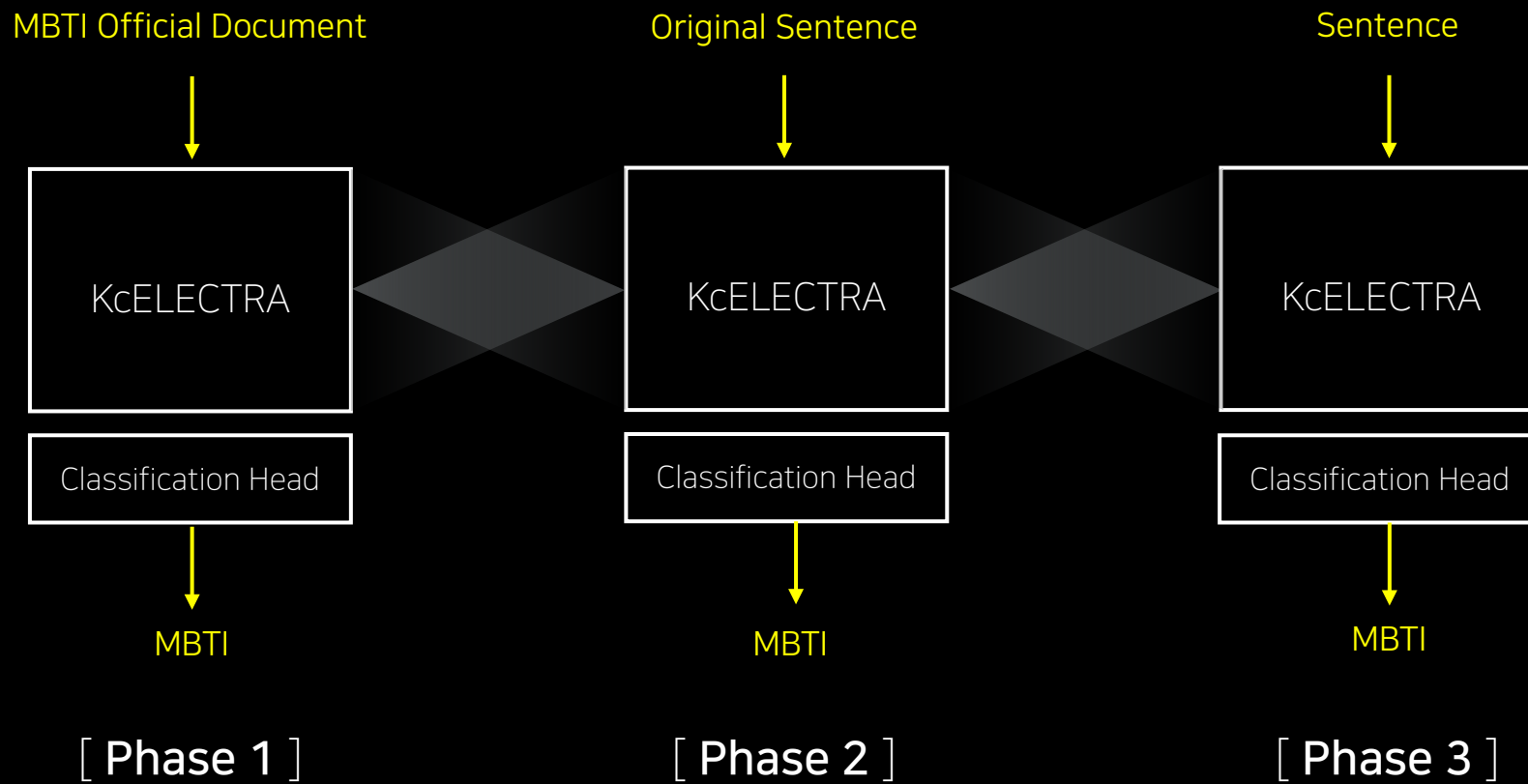


MLM Fine Tuning

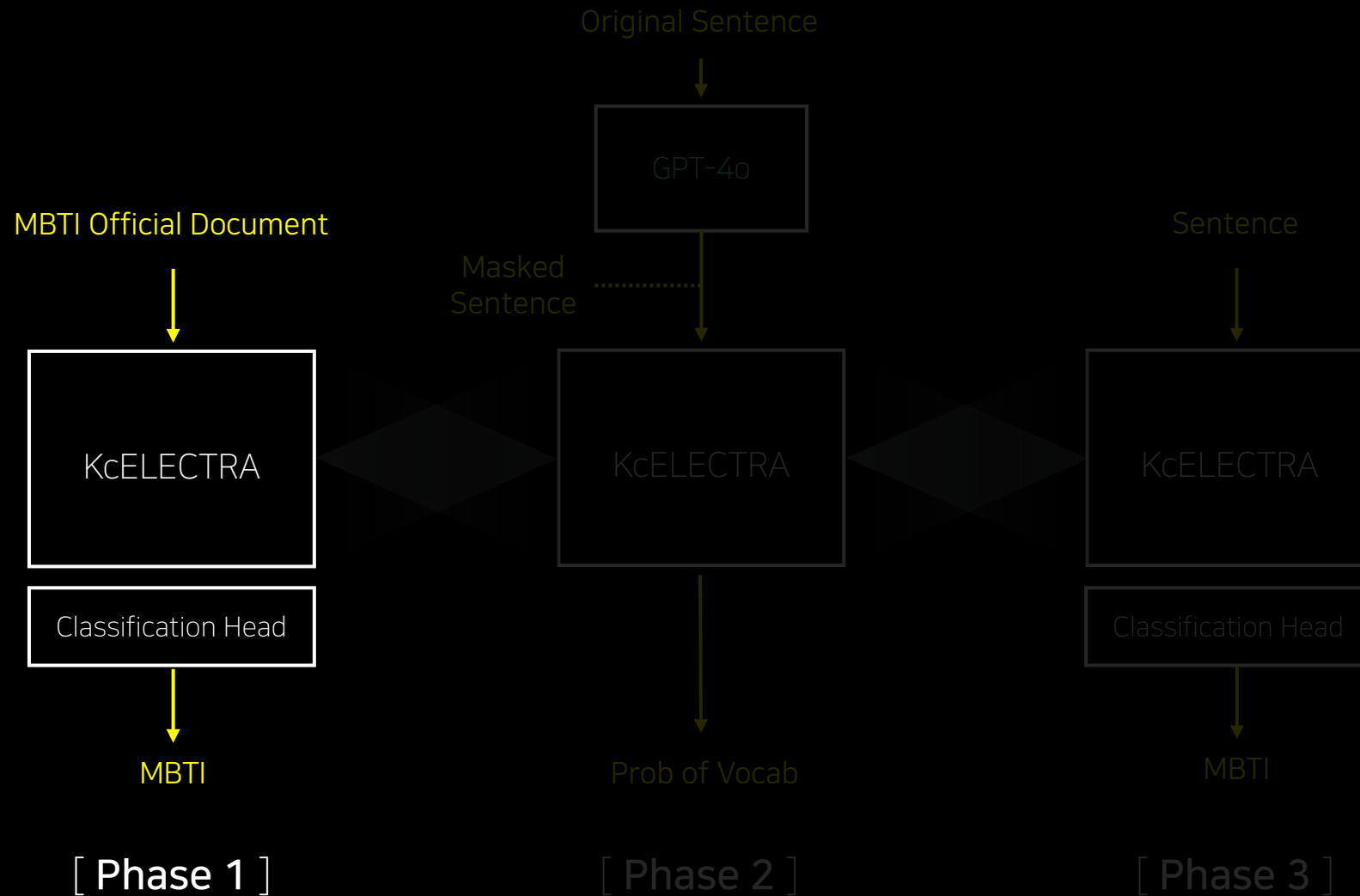
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MLM Fine Tuning





Phase 1



MBTI Official Document Dataset

[Personality Test](#)[Personality Types](#) ▾[Premium Suite](#)[Teams and Practitioners](#) ▾[Resources](#) ▾[Log In](#)[Take the Test](#)

그들은 급격한 합리적 자극 반응 과정에서 사실적이고 즉각적인 현실을 바탕으로 비판적 결정을 내리는 경향이 있습니다.

이것은 학교와 다른 고도로 조직화 된 환경을 ESTP에 대한 도전으로 만듭니다. 확실히 똑똑하지 않기 때문이 아니며, 그곳에서 잘 할 수는 있지만, 공식 교육의 연대적인 강의 접근은 이러한 성격이 일반적으로 즐기는 실습 학습과는 거리가 멉니다.

ESTP

Dataset

1440

=

Article

90

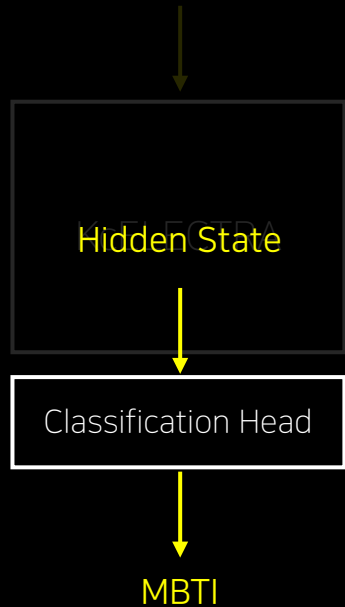
X

MBTI

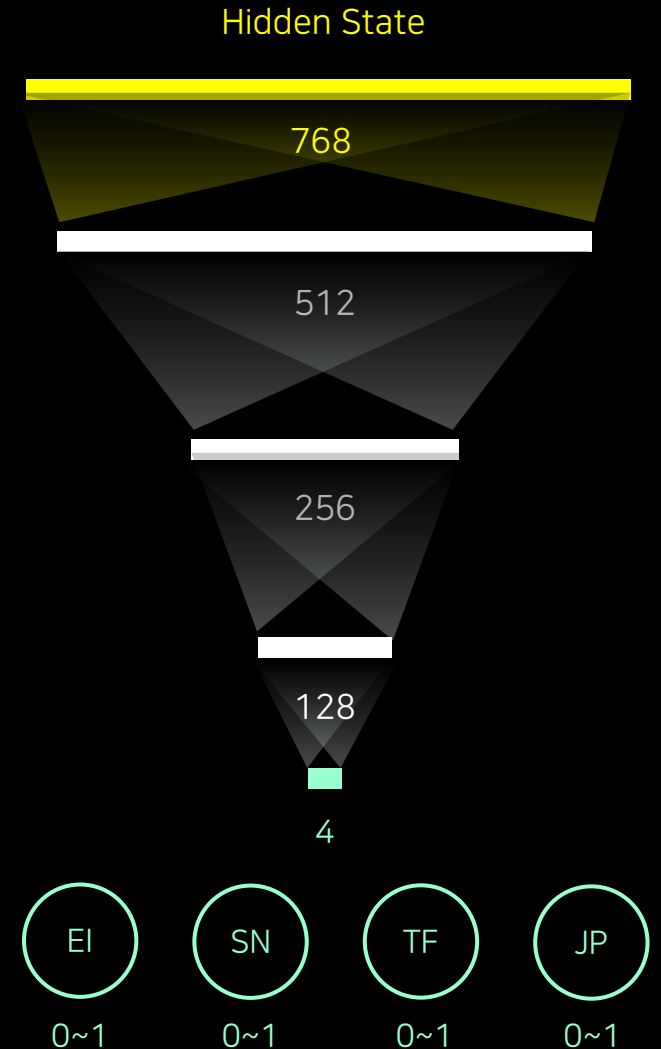
16

Classification Head

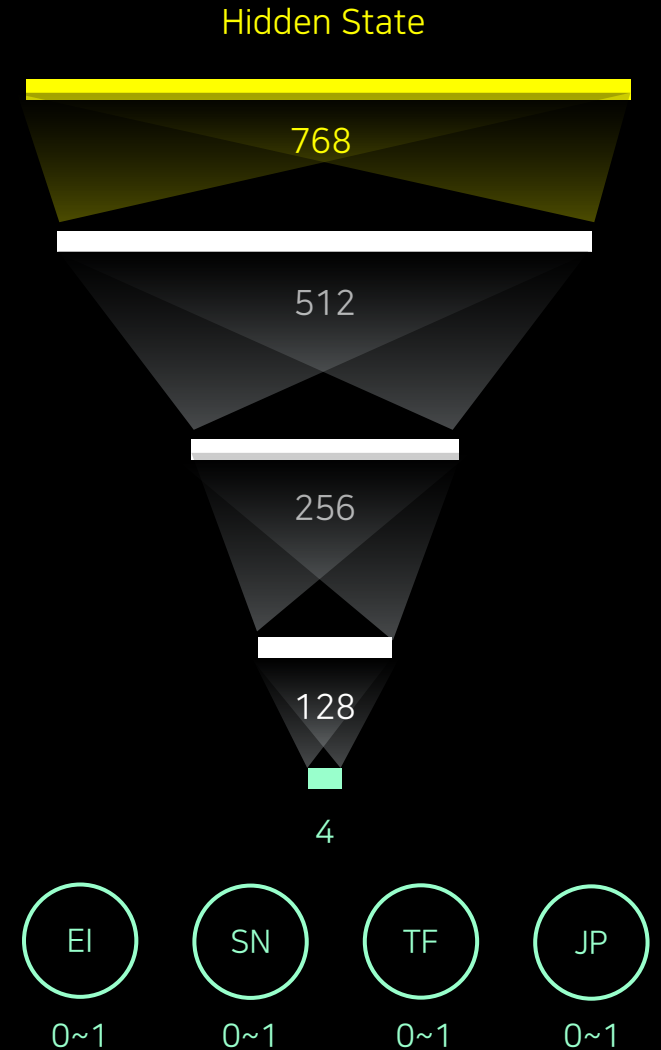
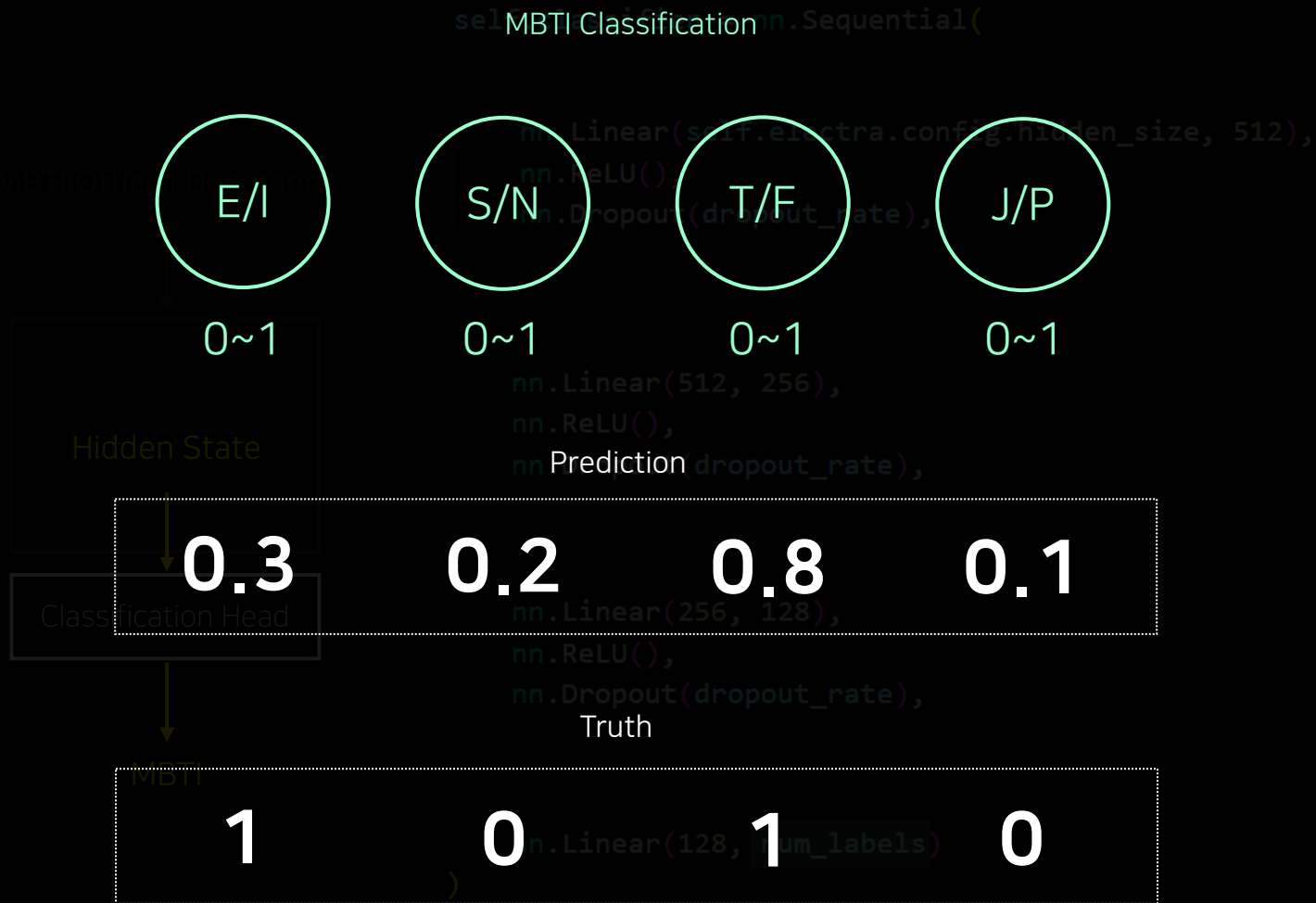
MBTI Official Document



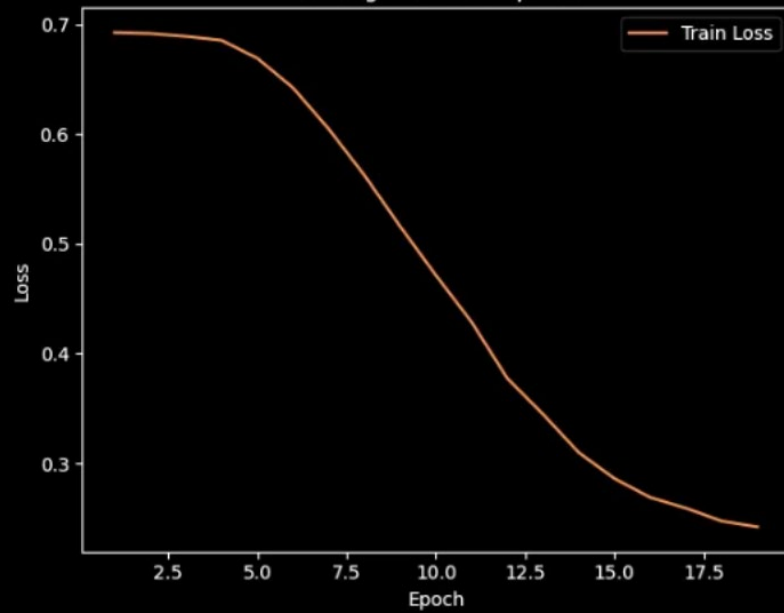
```
self.classifier = nn.Sequential(  
  
    nn.Linear(self.electra.config.hidden_size, 512),  
    nn.ReLU(),  
    nn.Dropout(dropout_rate),  
  
    nn.Linear(512, 256),  
    nn.ReLU(),  
    nn.Dropout(dropout_rate),  
  
    nn.Linear(256, 128),  
    nn.ReLU(),  
    nn.Dropout(dropout_rate),  
  
    nn.Linear(128, num_labels)  
)
```



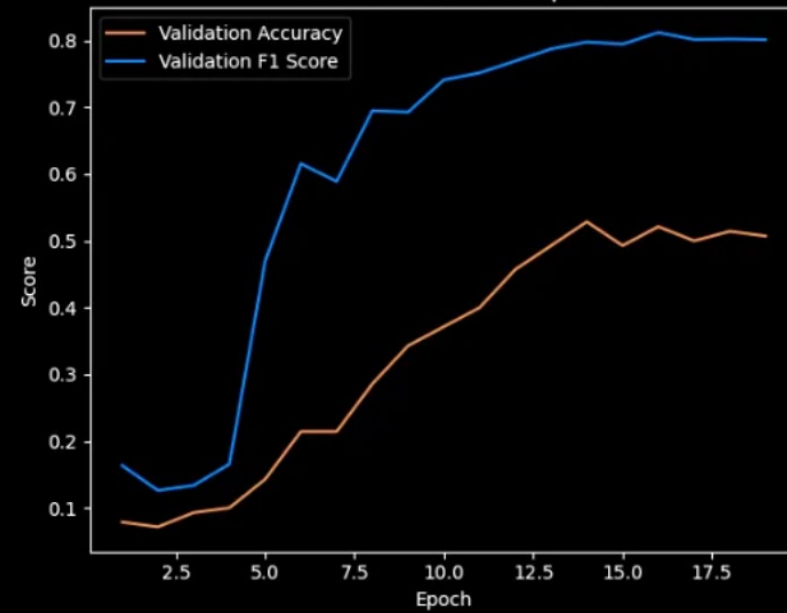
Classification Head



Training



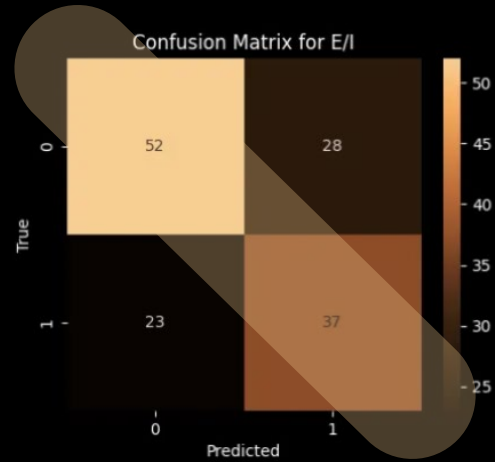
Training Loss Over Epochs



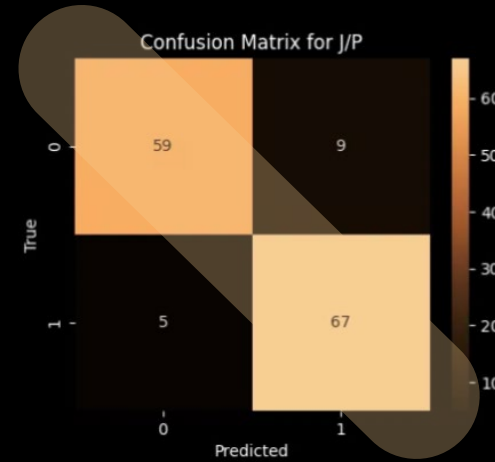
Validation Metrics Over Epochs

Training

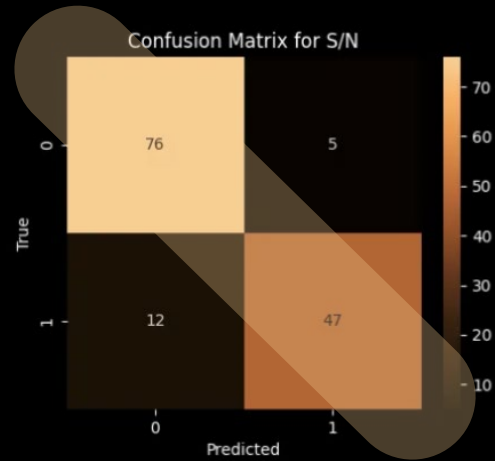
E/I



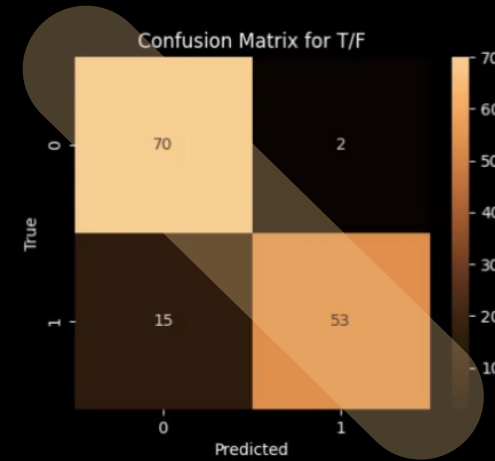
J/P



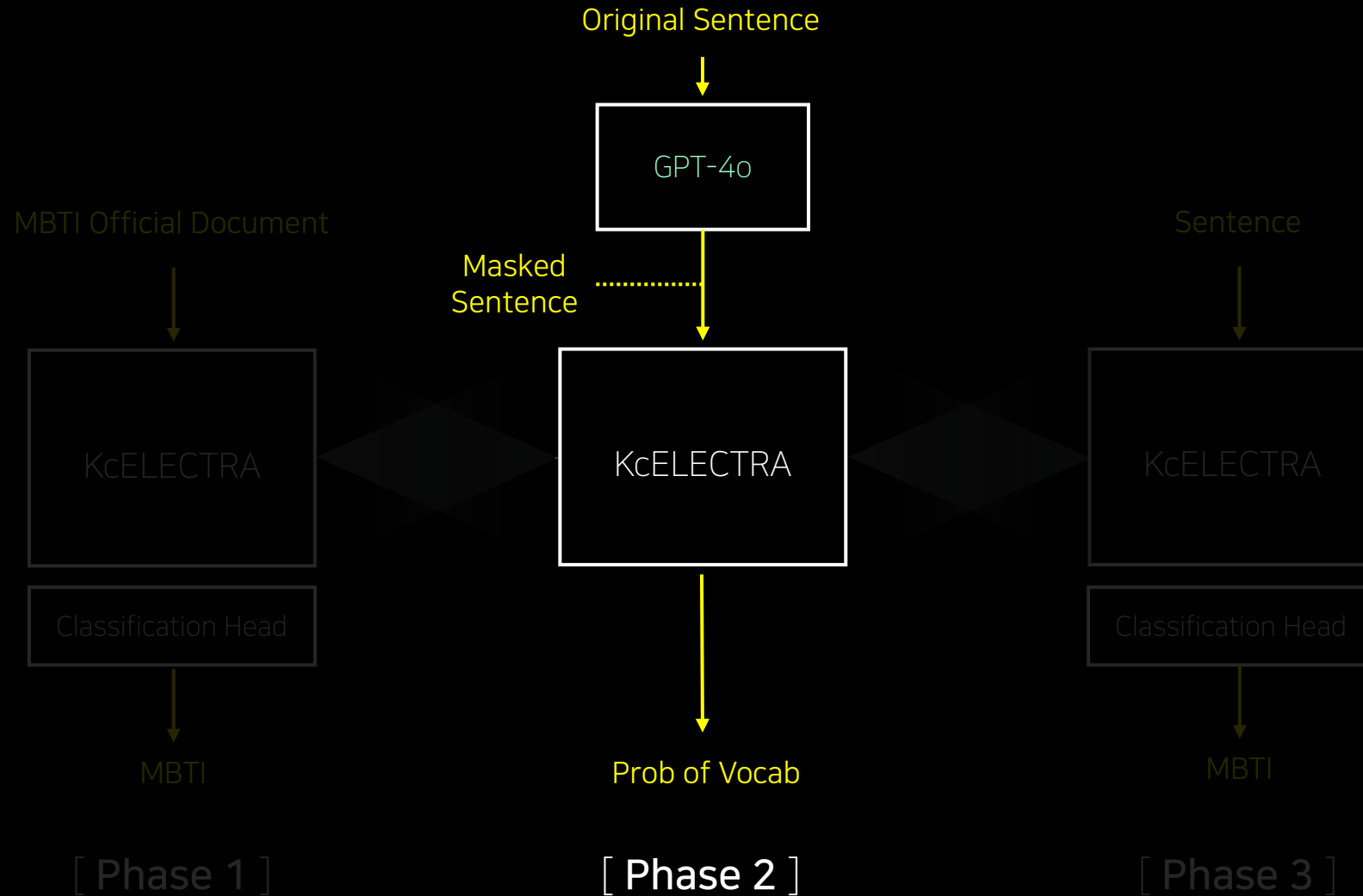
S/N



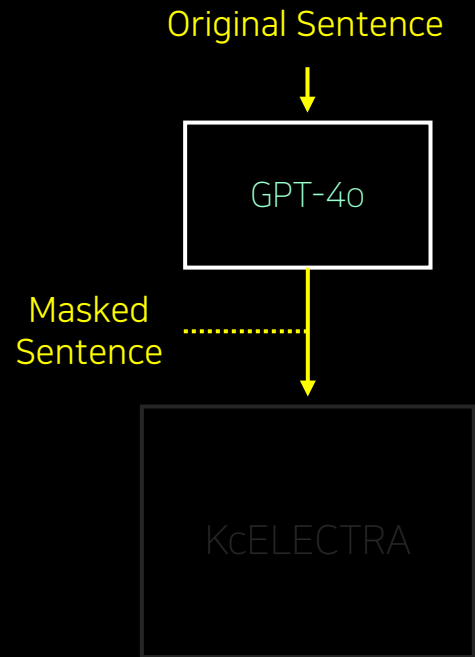
T/F



Phase 2



Masked Dataset



Dataset

14,400

Prob of Vocab

=

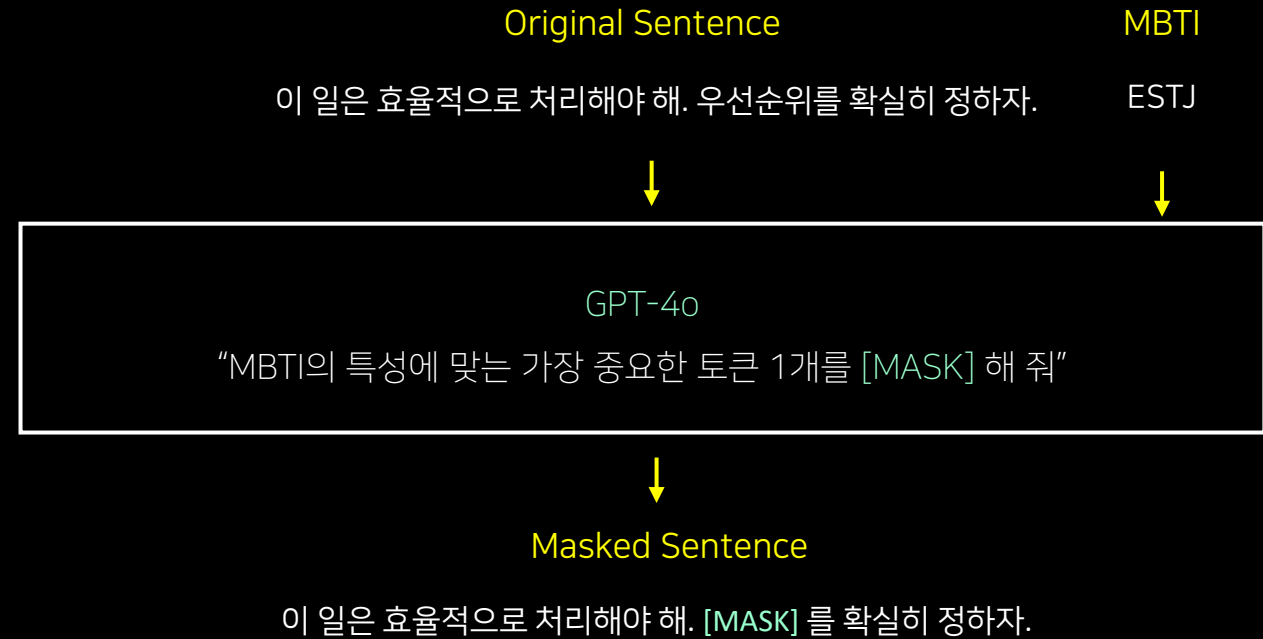
Original Sentence

900

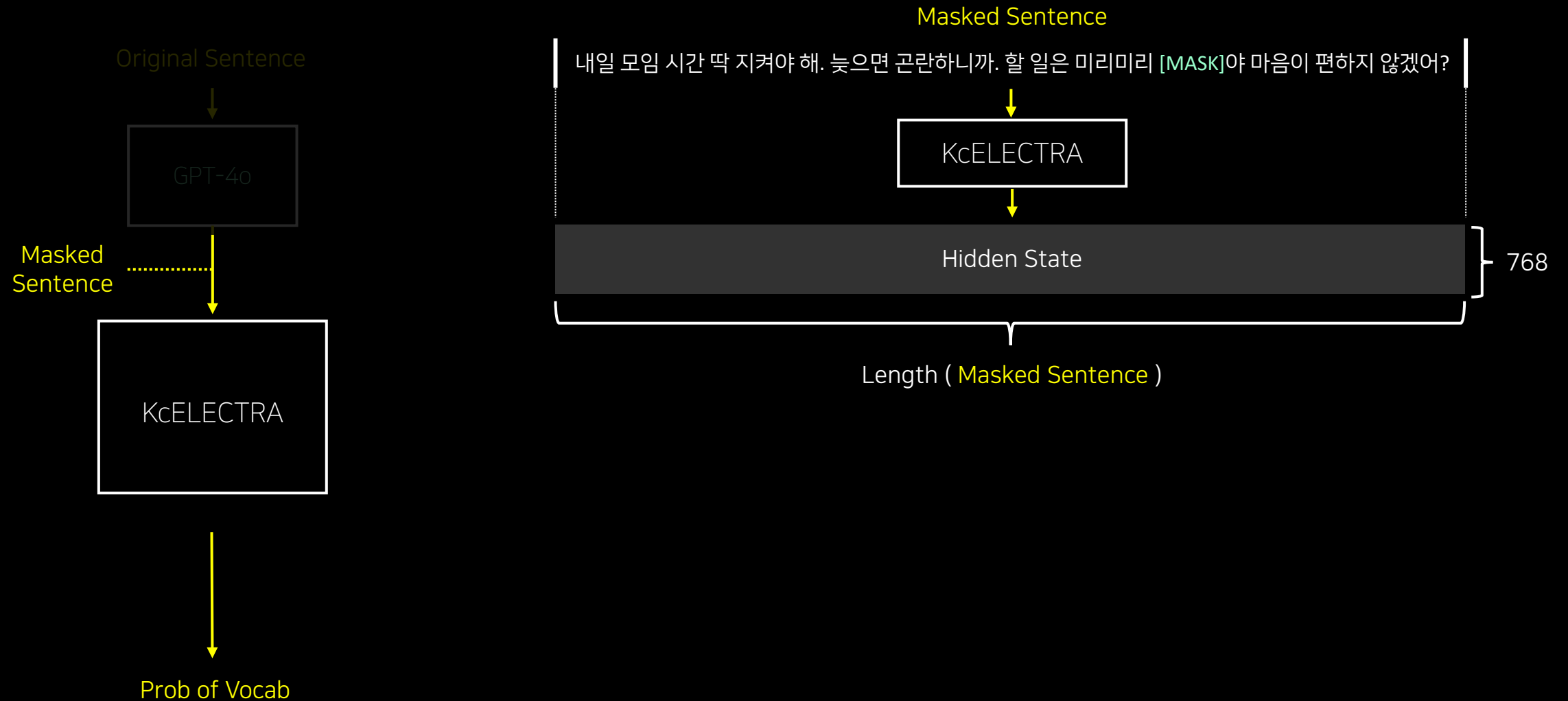
×

MBTI

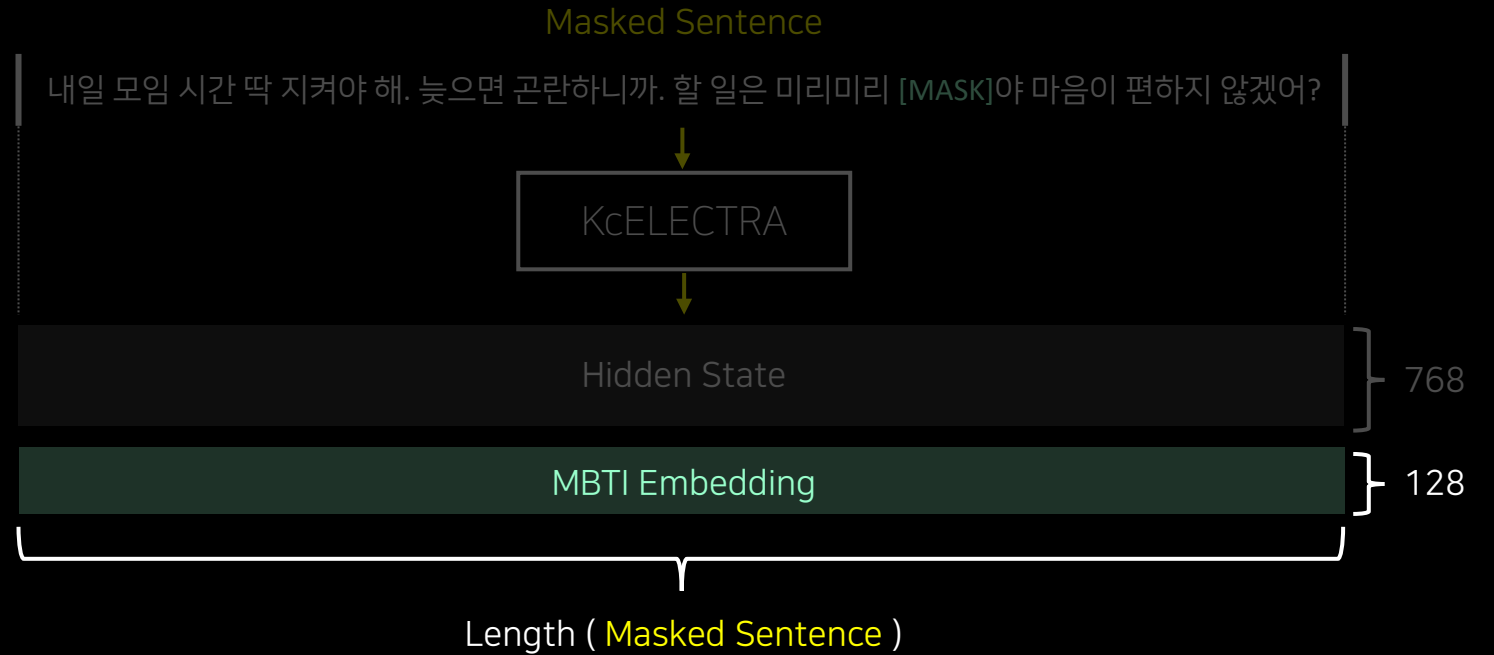
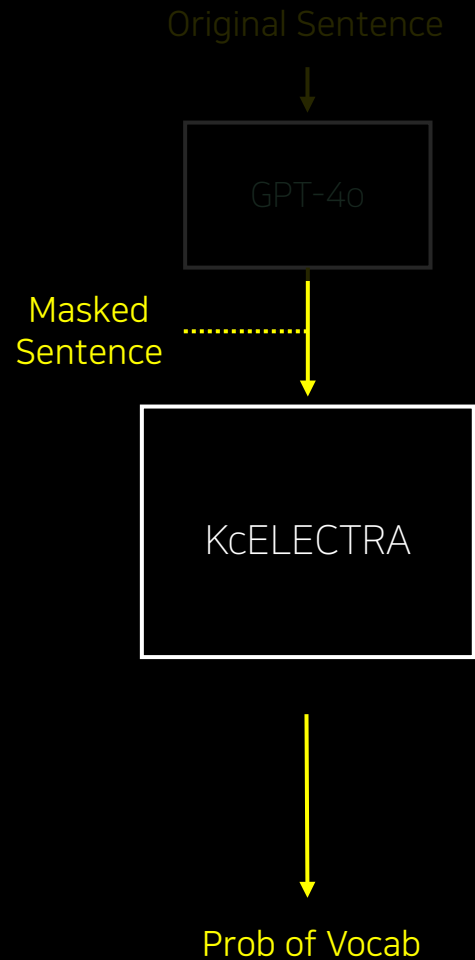
16



Hidden State



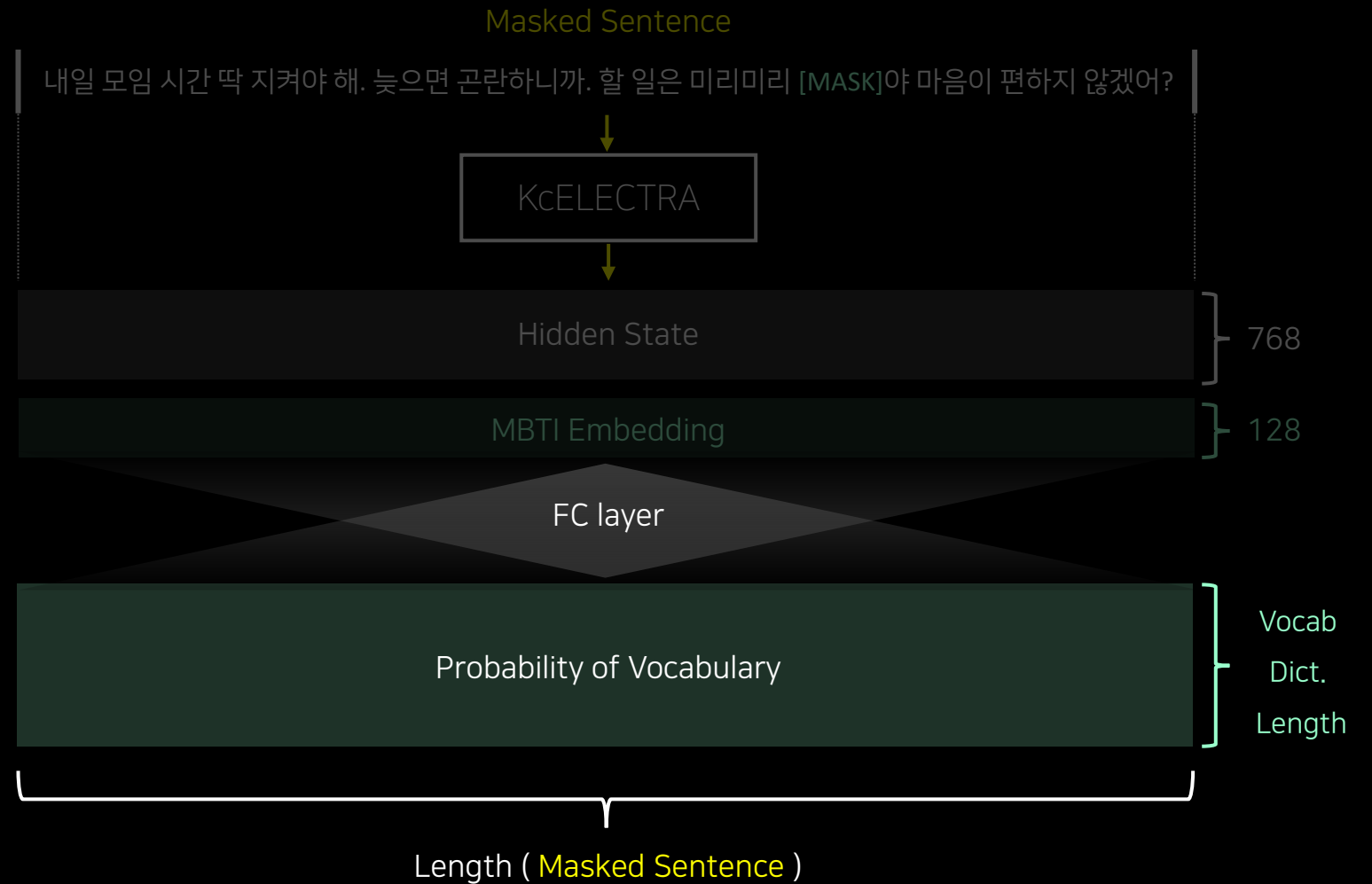
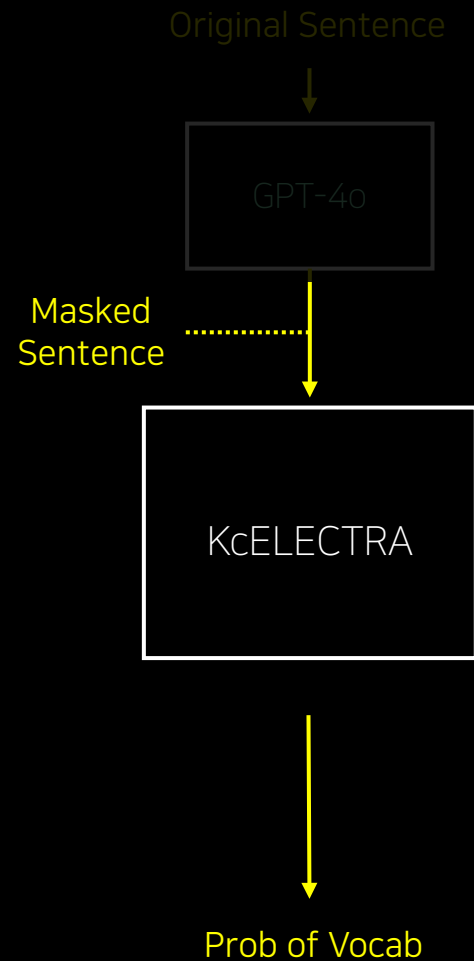
MBTI Embedding



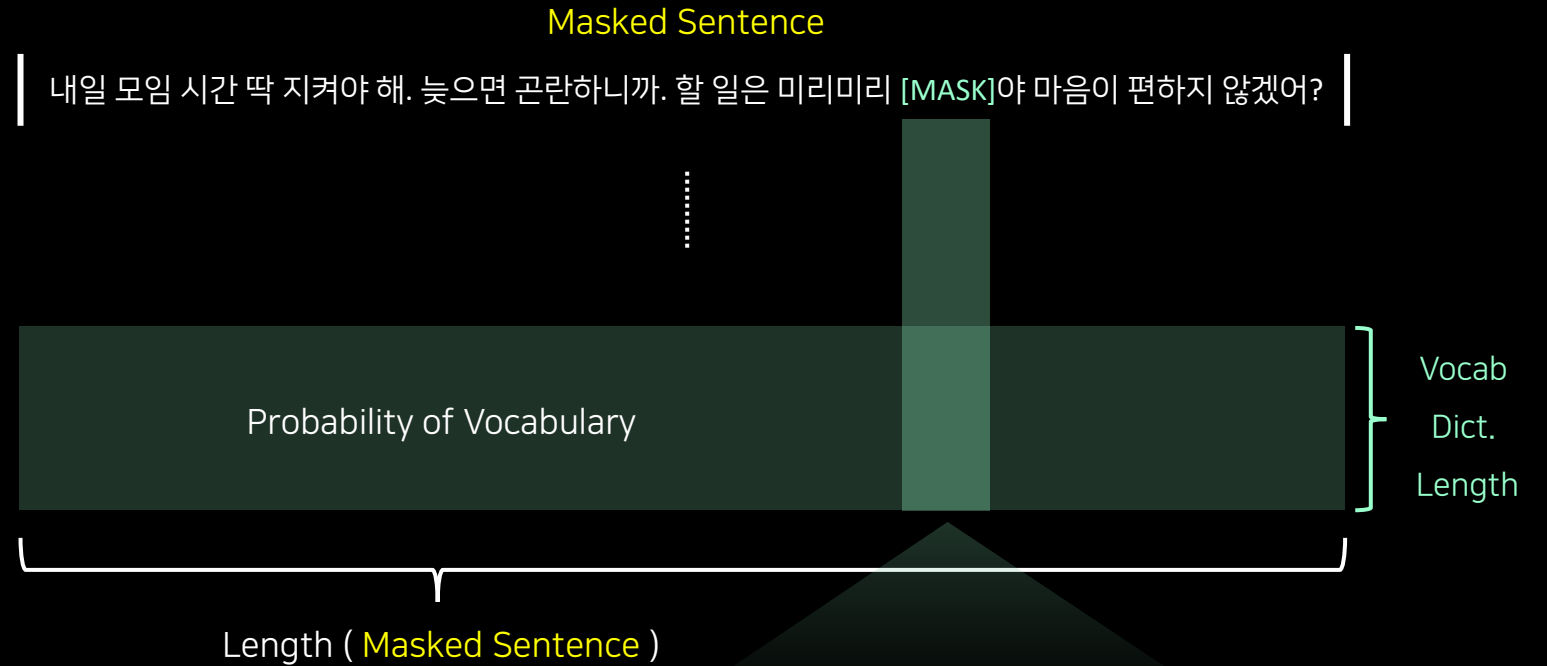
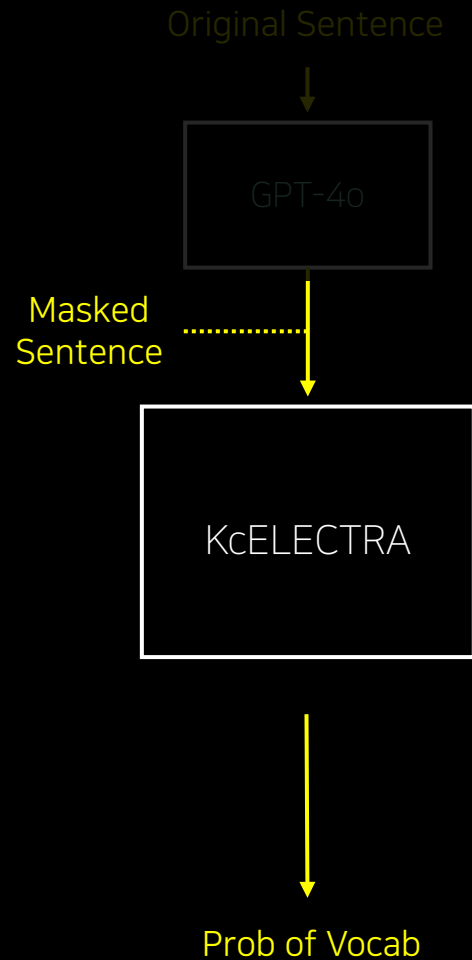
```
MBTI_TYPES = [  
    'INTJ', 'INTP', 'ENTJ', 'ENTP', 'INFJ', 'INFP', 'ENFJ', 'ENFP',  
    'ISTJ', 'ISFJ', 'ESTJ', 'ESFJ', 'ISTP', 'ISFP', 'ESTP', 'ESFP'  
]
```

0~15

Probability of Vocabulary



Probability of Vocabulary



ISTJ

Vocab 1	잘해	(Prob: 0.0143)
Vocab 2	정리해	(Prob: 0.0119)
Vocab 3	기록해	(Prob: 0.0080)
Vocab 4	체계	(Prob: 0.0075)
Vocab 5	세워	(Prob: 0.0071)

Probability of Vocabulary

Masked Sentence

내일 모임 시간 딱 지켜야 해. 늦으면 곤란하니까. 할 일은 미리미리 [MASK]야 마음이 편하지 않겠어?

ISTJ

Vocab 1	잘해	(Prob: 0.0143)
Vocab 2	정리해	(Prob: 0.0119)
Vocab 3	기록해	(Prob: 0.0080)
Vocab 4	체계	(Prob: 0.0075)
Vocab 5	세워	(Prob: 0.0071)

INTJ

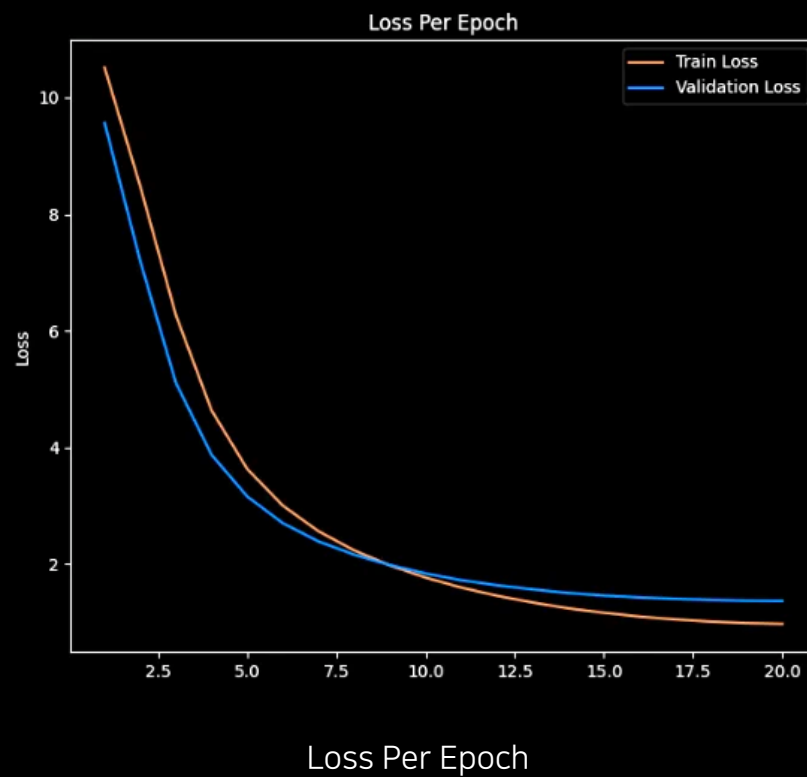
Vocab 1	적으로	(Prob: 0.0201)
Vocab 2	돼야	(Prob: 0.0201)
Vocab 3	잘	(Prob: 0.0168)
Vocab 4	체계	(Prob: 0.0164)
Vocab 5	정리	(Prob: 0.0154)

ENFP

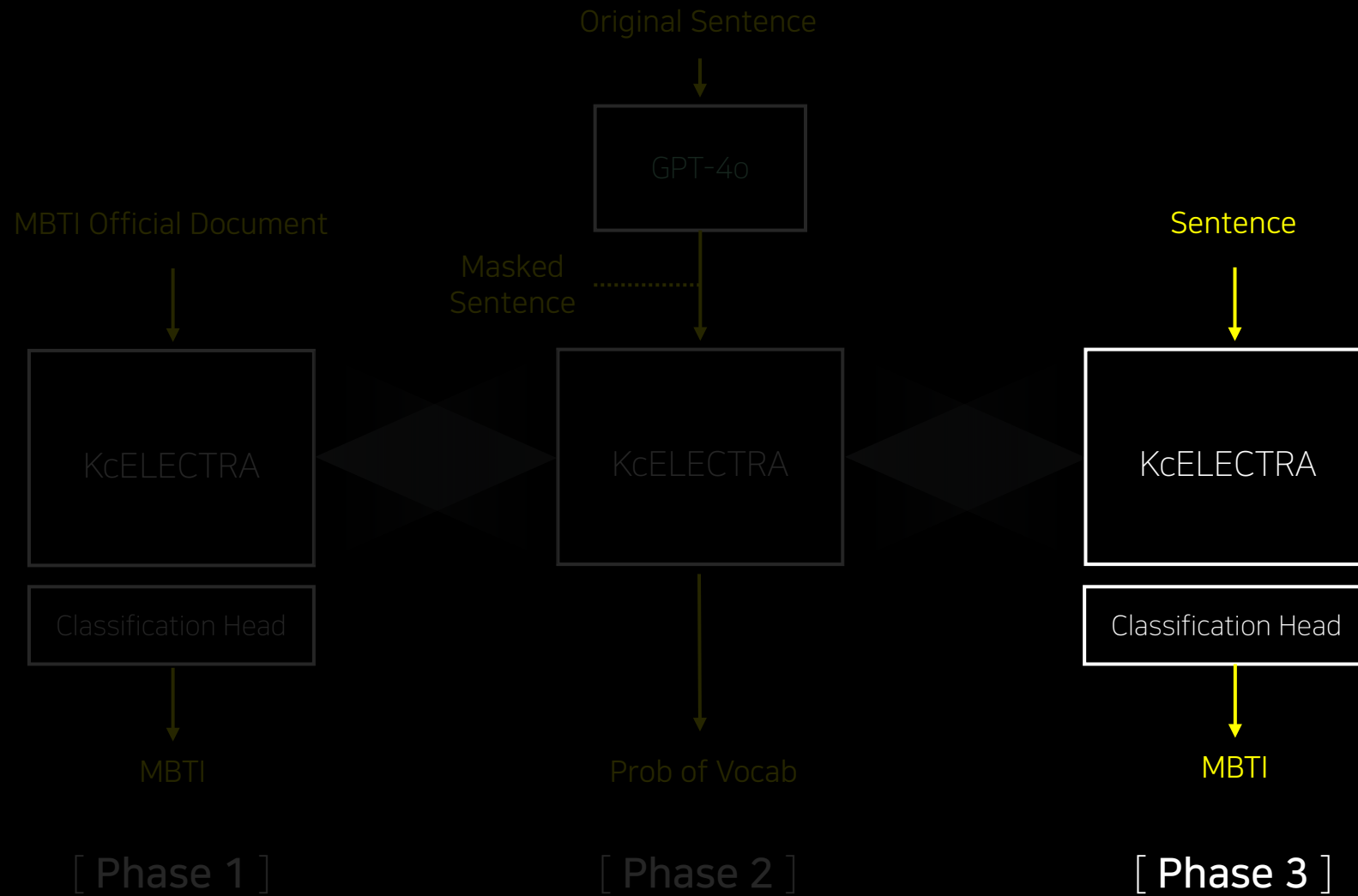
Vocab 1	자유롭게	(Prob: 0.0118)
Vocab 2	풀어	(Prob: 0.0111)
Vocab 3	감동	(Prob: 0.0111)
Vocab 4	잘	(Prob: 0.0111)
Vocab 5	신기	(Prob: 0.0085)

ESFP

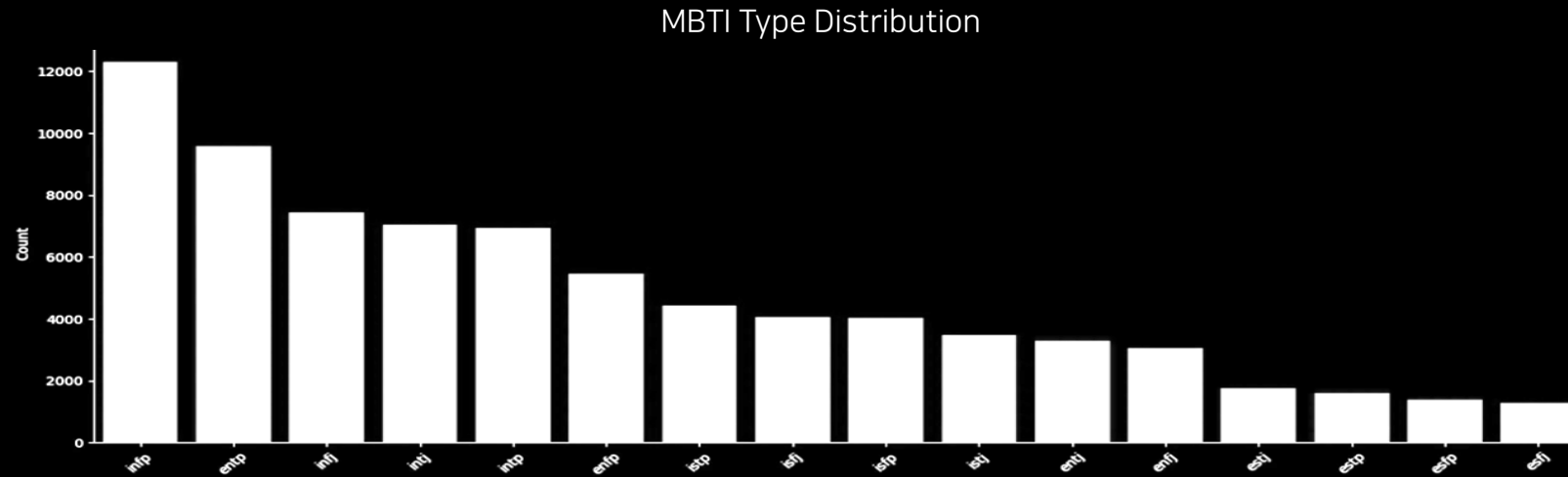
Vocab 1	자유롭게	(Prob: 0.0188)
Vocab 2	잘	(Prob: 0.0133)
Vocab 3	풀어	(Prob: 0.0094)
Vocab 4	정리	(Prob: 0.0079)
Vocab 5	효율	(Prob: 0.0068)



Phase 3



Article Dataset



님들이 과자나 치킨 같은 거 사 와서 먹으라고 했는데 동생이 안 먹겠다고 해서 방치해 놔던
먹을거리가 다음날 보니 말도 없이 없어졌을 때 화나 세영???

ISTJ

Article

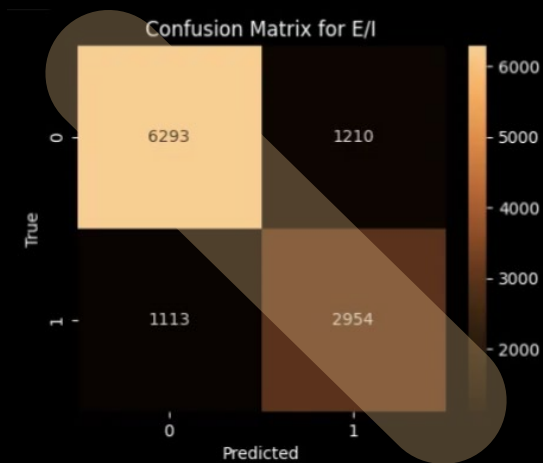
MBTI

80,000

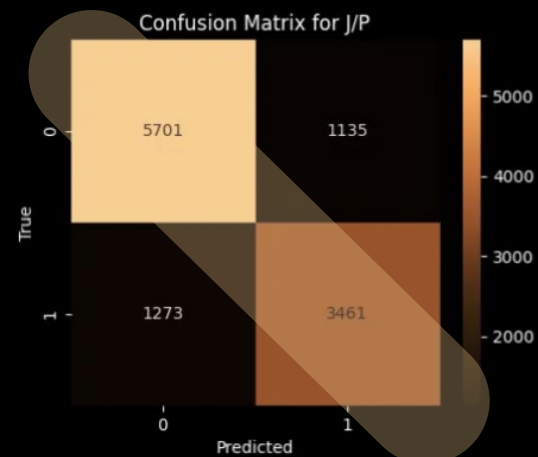
Dataset

MLM Fine Tuning	
Test Loss	1.0580
Test Accuracy	81.64

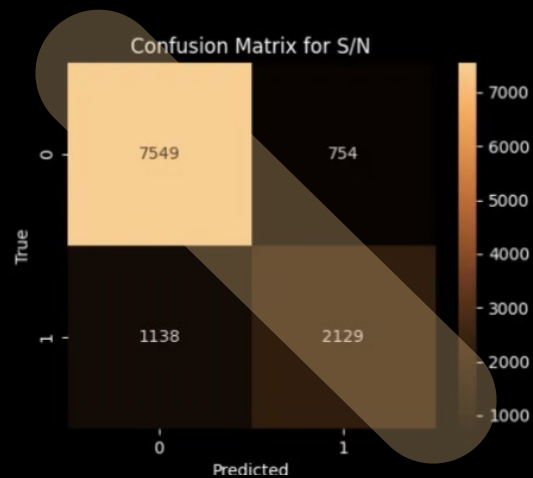
E/I



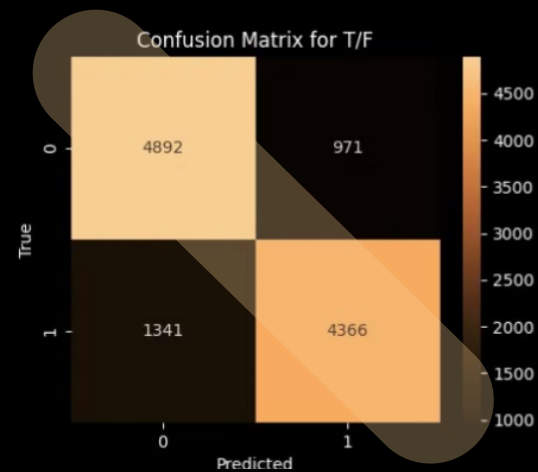
J/P



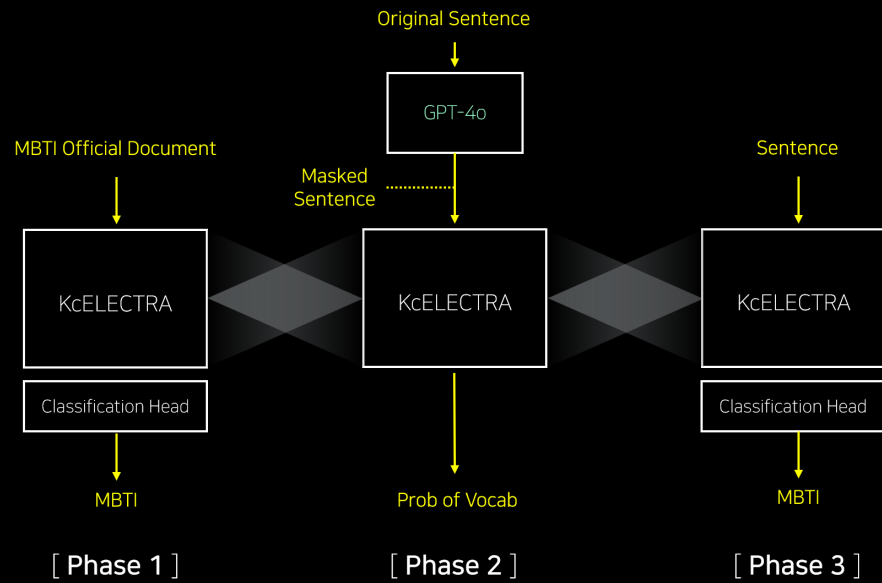
S/N



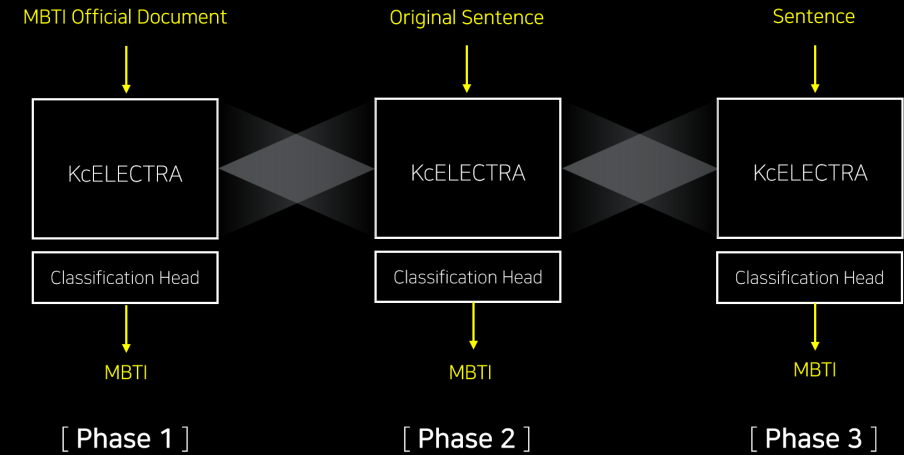
T/F



Comparison



MLM Fine Tuning



Fine Tuning

Comparison

	MLM Fine Tuning	Fine Tuning
E/I Accuracy	80.86	81.31
S/N Accuracy	82.31	82.82
T/F Accuracy	81.88	81.78
J/P Accuracy	81.50	79.29
Test Loss	1.0580	1.2715
Test Accuracy	81.64	81.30



김민규

너가 기존에 masking한 방식은 gpt한테 부탁한거라 그랬지??!
오케이오케이 그런 식으로 갈 것 같아 고마워!

Truth

ISFJ

MFT

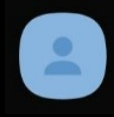
ISFP

75%

FT

ESFP

50%



성재영

나 1시 넘어서 들어갈 것 같은데 너 피곤하면 내일 아침에 할까?

INTP

INTP

100%

INTP

100%



이영주

다 했는데 MBTI 16개별로 나눠서 업로드 할까
아니면 다 합쳐서 업로드 할까? 컴비 강의실만가서 올릴게

ESTP

ESTJ

75%

ENFP

50%



이준성

더깔끔하게 할거면 솔직히 우리 그 마스킹한 데이터셋 랜덤 마스킹 해서 한번
더 돌려보는것도 나쁘지않은디 어떻게생각해 데이터팀한테 부탁해놓을까

INFP

INTP

75%

ENFP

75%



이현준

굳굳 두 문장이 딱 적당한 길이인 것 같아
이거 두 문장 번역과정에서 한국어로는 세 문장 돼도 괜찮아!

ISFJ

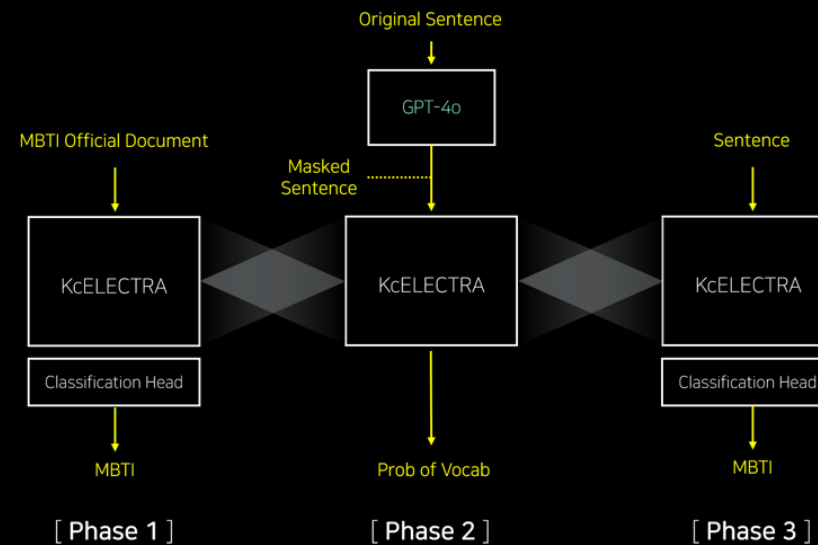
INFJ

75%

INFP

50%

MLM Fine Tuning



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