

LIST OF NOTATIONS

Symbol	Description
H	Structured representation of the user's historical news articles
C	Structured representation of candidate news article
T_i	Title of the i -th historical news article
A_i	Abstract of the i -th historical news article
D_i	Publication date of the i -th historical news article
T_C	Title of the candidate news article
A_C	Abstract of the candidate news article
D_C	Publication date of the candidate news article
[NSEP]	Special separator token used to distinguish features
S	Structured input sequence combining historical and candidate news
[Q1][Q2][Q3]	Prefix tokens to mark boundaries between history and candidate news
t_{ref}	Reference timestamp (maximum/latest publication date in the dataset)
$t(C)$	Timestamp of the candidate news article
Δt	Time difference between reference timestamp and candidate news timestamp
x	Input IDs representing tokenized text
m	Attention mask indicating valid tokens
$E_T(x_i)$	Token embedding of token x_i
$E_p(x_i)$	Position embedding of token x_i
$E(x_i)$	Combined input embedding (token + position embeddings)
Q, K, V	Query, Key, and Value matrices used in self-attention
d_k	Dimension of the key vector in self-attention
h	Number of attention heads in multi-head attention
W_O	Output weight matrix in multi-head attention
L	Logits representing relevance prediction
R	Relevance score predicted by the model
TD	Time decay score indicating freshness of the article
λ	Time decay factor controlling the rate of decay
T_{latest}	Timestamp of the user's latest read news article
T_{sC}	Timestamp of the candidate news article
F	Final score combining relevance and freshness
α	Weighting factor (between 0 and 1) balancing relevance and recency