

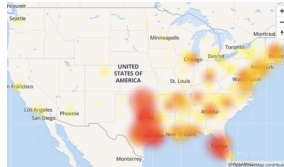
# Automated Summarization for Real-Time Production Status: An Application of TQFS



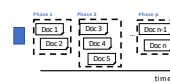
Shade El-Hadik, Nicholas Adams-Cohen, Emmanuel Munguia Tapia and Carsten Witte

## Problem Statement

Outages reported and tickets created



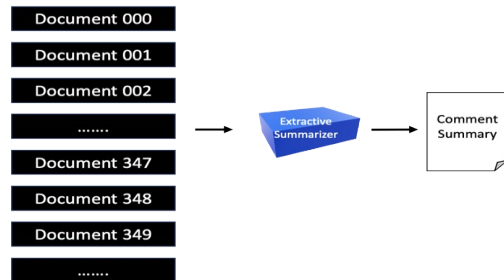
Tickets created



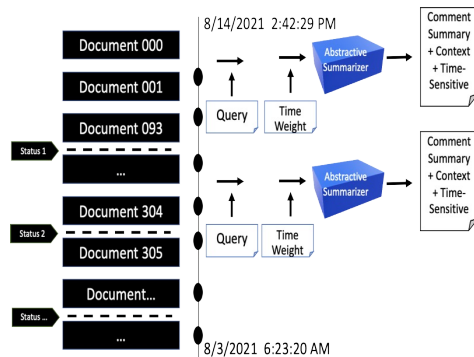
Each ticket progresses through phases with documented activities

The order of these phases and the corresponding documents are particularly important

## As-Is Approach



## TQFS Algorithm



## TQFS Details

### Algorithm 1: TQFS Algorithm

**Function Query** ( $D, r$ ):

**Input:**  $D$ : full set of time-series documents  
 $r$ : query set  
**Output:**  $Q$ : query score for each document

1. Append query set  $r$  to  $D \rightarrow [r, D]$
2.  $TF-IDF([r, D]) = [r', D']$
- for**  $D'_i \in D'$  **do**  
     $Q_i = \text{Cosine Similarity}(r', D'_i)$
- return**  $Q$

**Function Time** ( $T, \epsilon$ ):

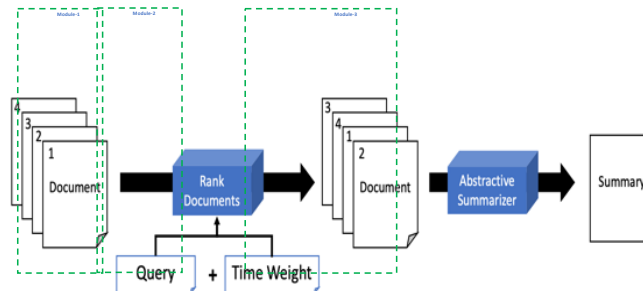
**Input:**  $T$ : full set of document timestamps  
 $\epsilon$ : normalization parameter  
**Output:**  $T'_i$ : time score for each document

- for**  $T_i \in T$  **do**  
     $T'_i = \left( (T_i - T_{min})(T_{max} - T_{min})^{-1} \right)^\epsilon$
- return**  $T'$

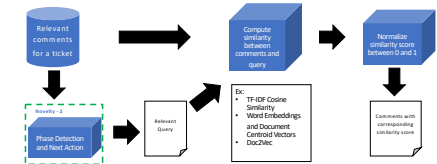
**With**  $D, T, r$ , and  $\epsilon$ :

- if**  $T$  **not continuous** **then**  
    convert  $T$  to unix timestamp
1. Calculate Query Scores  $\rightarrow Q = \text{Query}(D, R)$
  2. Calculate Time Score  $\rightarrow T' = \text{Time}(T, \epsilon)$
  - for**  $Q_i \in Q$  and  $T'_i \in T'$  **do**  
     $S_i = f(Q_i, T'_i) = Q_i * T'_i$
  3. Order  $D$  series documents in order of  $S$  scores  $\rightarrow D'$
  4. Keep first 512 tokens of  $D'$  ordered documents  $\rightarrow D'_{cut}$
  5. Use  $D'_{cut}$  as input to abstractive summarizer  
 $\rightarrow F = \text{abs.summ}(D'_{cut})$  where  $F$  is the final summary.

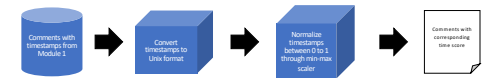
**Return**  $F$



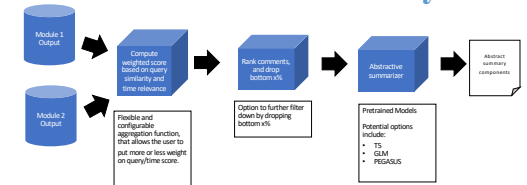
## Module 1- Query



## Time Weighting



## Aggregate Query and Produce Abstract Summary



## TQFS Performance

	Query Similarity	Timestamp	R1-Recall	R1-Precision	R1-F	R2-R	R2-P	R2-F	RL-R	RL-P	RL-F
TQFS	X	X	0.174	0.316	0.224	0.082	0.157	0.108	0.151	0.258	0.196
QAS	X		0.171	0.300	0.218	0.071	0.132	0.092	0.145	0.258	0.185
TS-Baseline		X	0.121	0.254	0.164	0.056	0.122	0.077	0.107	0.230	0.146

