

APPENDIX A

A.1 Query Terms used in *PSQ*

Table 3 shows the seed queries for our event categories.

A.2 Expanded Query Terms in *TQE*

Table 4 shows the expanded queries that *TQE* produced from the seed queries in Table 3. All queries are disjunctions of the terms shown, the numbers in parentheses indicate the relevance of each term, and #PRT is the number of pseudo-relevant timestamps.

A.3 Expanded Query Terms in *Embedding*

Table 5 shows the expanded queries that *Embedding* produced from the seed queries in Table 3.

A.4 Results of Combined system

Table 6 shows the precision obtained by combining all four approaches into one system.

TABLE 3
Query terms used in PSQ

| Event Type | Boolean Query |
|--------------------|---|
| AviationAccident | (plane OR aircraft OR airline) AND (crash OR crashed) |
| CyberAttackCompany | company AND (hack OR hacked OR hacking OR attack OR cyber) |
| CapitalPunishment | (kill OR killed OR punish OR punished OR punishment OR execute OR executed) |
| MilitiaTerrorAct | (bomb OR bombs OR kill OR killed OR die OR dies OR died OR attack OR assault OR destruction OR torment OR hijack OR hijacking OR kidnap OR kidnapping OR abduction OR terror) |
| PoliticianDying | politician AND (die OR dies OR died OR rip) |
| PoliticianVisits | politician AND (visit OR visits OR visited OR travel OR country) |

TABLE 4
Expanded query terms derived by TQE from the seed query

| Event Type | #PRT | Expanded Query Terms with weights | | | |
|----------------------|------|---|---|--|---|
| Aviation Accident | 735 | crash (1.78) jet (1.313) international (1.254) crashed (1.224) | plane (1.739) #news (1.26) muslim (1.231) pray (1.224) | flight (1.466) victims (1.256) air (1.227) indian (1.223) | allah (1.333) children (1.256) visit (1.225) |
| Capital Punishment | 400 | killed (2.21) seconds (1.428) killing (1.389) humanity (1.286) | children (1.474) direction (1.428) police (1.353) 2014 (1.284) | innocent (1.444) kill (1.406) war (1.289) death (1.279) | murdered (1.438) israel (1.404) black (1.288) |
| Cyber Attack Company | 651 | north (1.205) online (1.193) stock (1.18) list (1.173) | company (1.203) gift (1.192) price (1.179) present (1.173) | interview (1.199) giveaway (1.187) 2014 (1.177) free (1.173) | update (1.195) prices (1.181) beauty (1.174) |
| Militia Terror Act | 318 | killed (1.778) 2014 (1.351) innocent (1.288) lives (1.277) | died (1.639) die (1.3) dead (1.286) death (1.27) | rip (1.494) year (1.299) years (1.282) killing (1.263) | children (1.388) kill (1.298) peace (1.279) |
| Politician Dying | 157 | politician (1.648) market (1.245) media (1.231) staff (1.22) | indian (1.258) minister (1.236) event (1.229) fab (1.219) | culture (1.255) latest (1.232) popular (1.229) prices (1.217) | london (1.249) news (1.231) data (1.229) |
| Politician Visits | 412 | politician (1.436) stories (1.167) coins (1.162) english (1.158) | #nowplaying (1.179) pic (1.167) power (1.16) country (1.157) | tea (1.173) photo (1.167) fear (1.16) news (1.157) | daily (1.17) busy (1.163) free (1.158) |

TABLE 5
Query terms obtained using *Embedding* approach

| Event Type | Boolean Query |
|--------------------|---|
| AviationAccident | (airline OR airlines OR airline's OR airways OR #airlines OR jetstar OR #airline OR jetblue OR aircraft OR aircrafts OR boeing OR #aircraft OR unmanned OR aviation OR f-16 OR aircraft's OR flight OR flight's OR plane OR flig OR sfo OR flts OR yyz OR plane OR flight OR planes OR airliner OR airplane OR helicopter) AND (crash OR crashes OR collision OR pileup OR accident OR crashed OR accid OR crashed OR crashing OR collided OR collapsed OR exploded OR accidents OR acciden OR hashtags:accident OR incident) |
| CyberAttackCompany | company AND (cyber OR hashtags:cyber OR hashtags:ccureit OR hashtags:infosec OR hashtags:cybersecurity OR hashtags:cybercrime OR hashtags:cyberwarfare OR hashtags:securityaffairs OR hashtags:hacksurfer OR hashtags:hacking OR hack OR hacking OR hashtags:hack OR hacker OR hackers OR hacks OR ifunbox OR hashtags:kaminfo OR hashtags:hacksurfer OR hackers) |
| CapitalPunishment | (execution OR executions OR executed OR executio OR prosecution OR hashtags:deathpenalty OR executing OR execute OR hashtags:execution OR prosecute OR prosecuted OR prosecuting OR punish OR convict OR investigate OR execution OR executing OR prosecute OR punish OR convict OR investigate OR extradite) |
| MilitiaTerrorAct | (terror OR terrorism OR terrorist OR islamist OR hashtags:terror OR terrorists OR jihadist OR terroris OR isis OR militant OR extremist OR qaeda OR jihadi OR islamists OR extremists OR qaida OR extremism OR corruption OR terroris OR radicalization OR violence OR extremists OR isil) |
| PoliticianDying | (politician OR politicians OR bureaucrat OR journo OR journalist OR parliamentary OR democrat OR ideologue OR dictator OR technocrat OR bureaucrats OR govnt OR minister OR ministers OR ministe OR minist OR ministers OR minster OR ministerial OR ministry OR secretary OR secy OR minsiter) AND (rip OR r.i.p. OR r.i.p OR hashtags:rip OR hashtags:restinpeace OR hashtags:r.i.p OR died OR death OR deat OR hashtags:death OR demise OR deaths OR dealth OR murder) |
| PoliticianVisits | (politician OR politicians OR bureaucrat OR journo OR journalist OR parliamentary OR hashtags:politician OR democrat OR ideologue OR dictator OR technocrat OR hashtags:bureaucrat OR govnt OR minister OR ministers OR ministe OR minist OR ministers OR minster OR ministerial OR ministry OR secretary OR secy OR minsiter) AND (visit OR visiting OR vist OR vsit OR join OR check OR itineraries OR visist OR register OR h34-official OR hashtags:visit OR visited OR visting OR volunteering OR welcoming OR visitng OR relocated OR meeting OR attending OR traveling OR travel OR travelers OR travelling OR explore OR hashtags:travel OR traveller OR traveler OR backpacking OR travellers) |

TABLE 6
Combined precision of all the systems

| Event Type | Combined precision |
|----------------------------------|--------------------|
| AviationAccident | 96.09 |
| AviationAccident (only airlines) | 87.59 |
| CapitalPunishment | 75.26 |
| CyberAttackCompany | 53.82 |
| MilitiaTerrorAct | 75.90 |
| PoliticianDying | 72.73 |
| PoliticianVisits | 35.76 |