Leveraging Localized Social Media Insights for Early Warning Systems

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Social Media in a nutshell

- Social Media has positioned as a **channel for getting unfiltered feedback** from customers.
- Social Media works like a **sensor**: 24x7 near real time feedback
- **Mobile Internet** emerged and transformed the way people interacted with the SM platforms
- Interactions became more pervasive (from everywhere) and **geo-location capabilities** were added on top
- Platforms like 4square created **new business models** just based on geo-positioning
- Main stream players like FB, Twitter, etc implemented geo-location to **enrich user experience**.

SM icons by: http://colaja.deviantart.com/

Early Warning Systems (EWS)

- Systems to alert about **changing conditions** in a give environment to allow for **quick reaction**

- Social Media **near real time message spreading nature** proved to be a good source to feed EWS
- Used in different areas like epidemic expansion, disaster prevention, etc.
- Recently also discovered for brands and companies, especially the ones providing a service

SM to feed EWS

A Place	A Brand	SM interactions	A Model	Input for EWS
Chelsea 	Lime-lemon Inc 	Δt 	Δt Perceived Impact xyz; Perceived Impact abc	Δt Critical; Medium High
Chelsea 	TwinOrange 	...	...	...
Candem 	TwinOrange 	...	...	...

Our Model: definitions

The **User in the location** under analysis

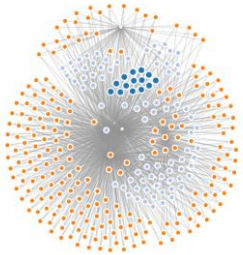
$$U \equiv \{u\},\ \forall u_i \in U,\ InLocation(u_i, \Delta t)$$

The **Social Network** for the user

$$SN(u_i) \equiv \{u\},\ \forall u_j \in SN(u_i),\ Follows(u_i, u_j)$$

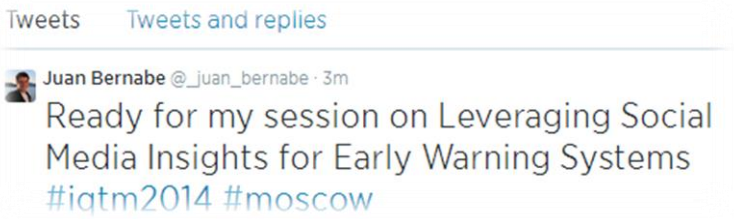
… and for all Users

$$SN(U) \equiv \{u\},\ \forall u_i \in SN(U),\ \exists u_j \in U\ |u_i \in SN(u_j)$$



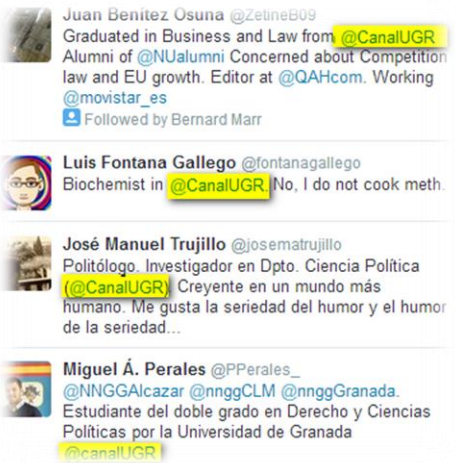
The **User Interaction**

$$UserInteractions\ (u_i, \Delta t) \equiv \{it\},\ \forall it_i \in UserInteractions\ (u_i, \Delta t),\ Author(u_i, it_i, \Delta t)$$



The **Entity** and the interactions related to the Brand

$$Interactions\ (u_i, E, \Delta t) \equiv \{it\},\ \forall it_i \in Interactions\ (u_i, E, \Delta t),\ Author(u_i, it_i, \Delta t)\ \wedge related(it_i, E)$$



Our Model: metrics

Entity Engagement Index

Importance of SM interaction with the Entity considering all interactions from the author

$$Engaged\ (u_i, E, \Delta t) \equiv True, \exists it_i,\ it_i \in Interactions\ (u_i, E, \Delta t), u_i \in U \cup SN(U)$$

$$EntityEngagementIndex(u_i, E, \Delta t) = \frac{\#\ Interactions\ (u_i, E, \Delta t)}{\#(\cup_{k=1}^{\#E} Interactions\ (u_i, E_i, \Delta t)}$$

$$EntityEngagementIndex(u_i, E, \Delta t) = \frac{\#\ Interactions\ (u_i, E, \Delta t)}{\#Interactions(u_i, \Delta t)}$$

Differential Purpose Factor

Importance of SM interaction considering all interactions within the same Communication Purpose Category

$$DPF(u_i, E, P, \Delta t) = \frac{\#(Interactions\ (u_i, E, \Delta t) \cap Interactions\ (u_i, P, \Delta t))}{\#Interactions\ (u_i, P, \Delta t)}$$

 # Exposed Users

Importance considering the number of SM users exposed to the SM interaction

$$Exposed\ (u_i, u_j, E, \Delta t) = \begin{cases} True, & u_j \in SN(u_i), \exists it_k, it_k \in Interactions(u_i, E, \Delta t), \\ & P(read(u_j, it_k, \Delta t)) \geq Threshold \\ False, & otherwise \end{cases}$$

$$ExposedUsers(u_i, E, \Delta t) \equiv \{u\},\ \forall u_j,\ Exposed(u_i, u_j, E, \Delta t) = True,\ u_i \in U$$

Impact $Impact(u_i, E, P, \Delta t) = \Im(EntityEngagementIndex(u_i, E, \Delta t), DPF(u_i, E, P, \Delta t),\ \#ExposedUsers(u_i, E, \Delta t))$

Making the insights actionable

Entity Engagement Index

Importance of SM interaction with the Entity considering all interactions from the author

$$EntityEngagementIndex(u_i, E, \Delta t) = \frac{\#\ Interactions\ (u_i, E, \Delta t)}{\#Interactions(u_i, \Delta t)}$$

Differential Purpose Factor

Importance of SM interaction considering all interactions within the same Communication Purpose Category

$$DPF(u_i, E, P, \Delta t) \approx 1$$

 # Exposed Users

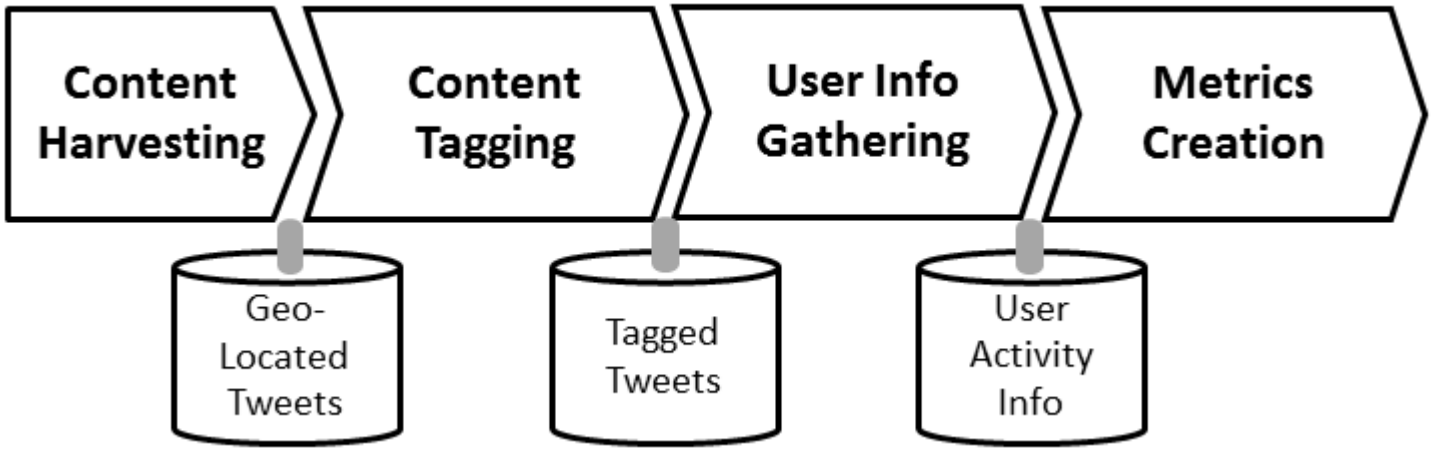
Importance considering the number of SM users exposed to the SM interaction

$$\#ExposedUsers(u_i, \Delta t) \approx \#SN(u_i) * K,\ K \in [0, 1]$$

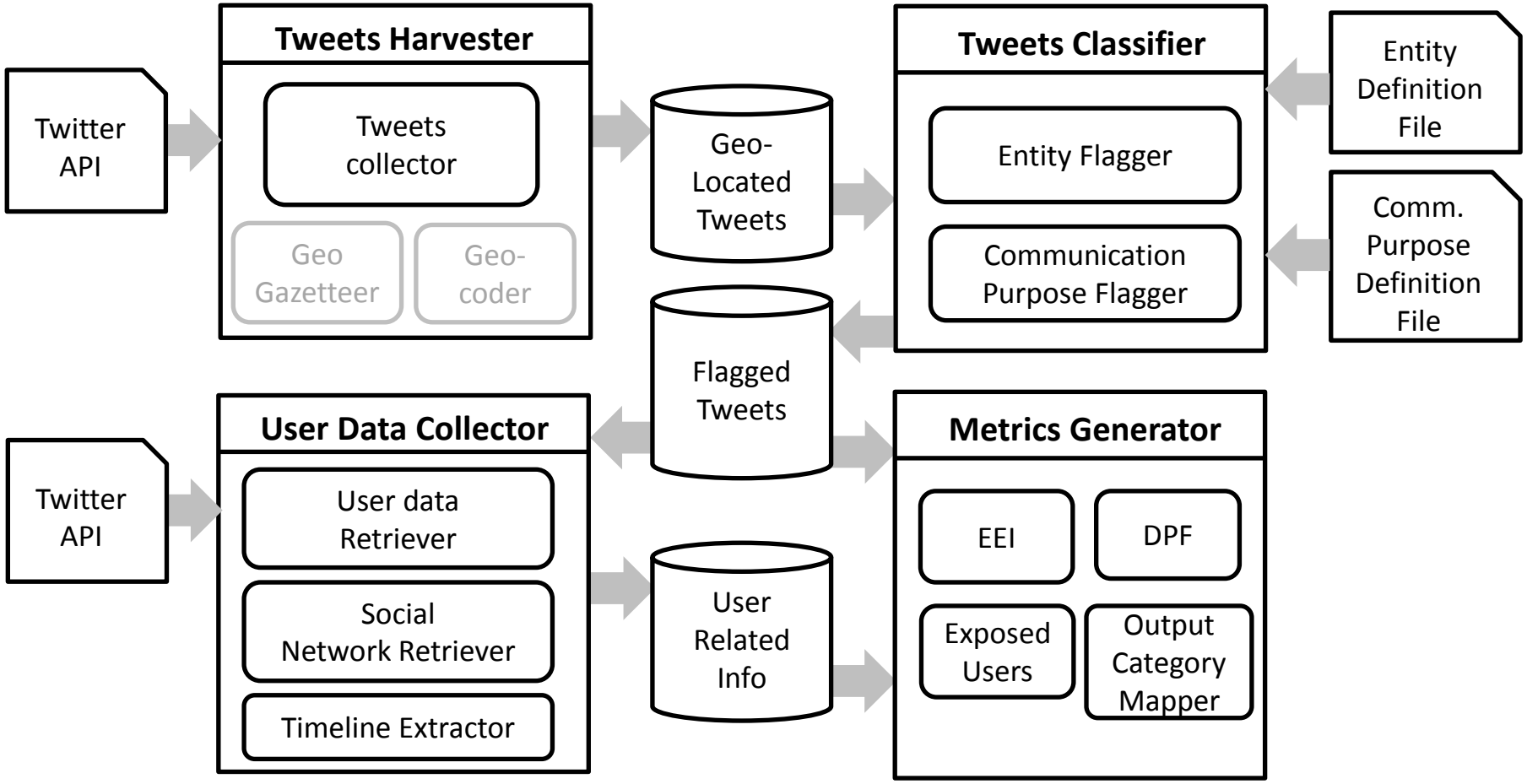
Impact Mapping to Consumable Category

Mapper (Impact) = [C], C ϵ {R,A,G}

The system processes



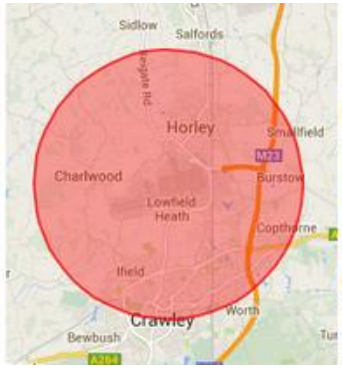
The system architecture



The show-case

2 Airports

Gatwick



Heathrow

Time

From: 23rd of November 2013

To: 23rd of January 2014

SM Interactions: 852319

6 Railway Transportation Brands:

National Rail

SOUTHERN

GATWICK EXPRESS

Heathrow Express

Virgin trains

First

6 Railway Transportation Brands:

	All	Virgin Trains	Southern Rail	National Rail	FirstCC	Gatwick Express	Heathrow Express
Gatwick Airport							
Total	10983	12	1185	8717	565	504	0
Compaints	5911	4	545	4779	352	231	0
Heathrow Airport							
Total	2817	26	17	2430	9	0	335
Compaints	668	8	10	572	2	0	75

Top 20 terms in the Communication *Purpose Category Complaints* by frequency

Top 10	delay	no train	taxi	cancel	shut	closed	disrupt	flood	broken	late	problem
	10,48%	7,16%	4,98%	4,87%	3,75%	3,09%	2,69%	2,63%	2,05%	2,00%	1,97%
Top 20	break	fire	miss	f**k	affect	alter	fault	bad	chaos	stuck	shit
	1,92%	1,84%	1,82%	1,62%	1,54%	1,47%	0,95%	0,92%	0,86%	0,79%	0,74%

Service disruptions on the 24th Jan. and 17th Feb.

Storms across Britain leave five dead and Christmas travel in chaos

Deaths linked to severe weather rise as rail, road, air and ferry disruptions hit thousands trying to get away for Christmas

Peter Walker, Ben Quinn and Conal Urquhart
theguardian.com, Tuesday 24 December 2013 22.24 GMT

Passengers study the departure boards as they wait for trains in King's Cross station in London. Photograph: Oli Scarff/Getty Images

Five people have died since Monday and thousands have had Christmas disrupted after the UK was battered by strong winds and heavy rain causing widespread chaos to rail, road, air and ferry travel.

While most airports were operating normally, passengers were advised to check with airlines before travelling. Gatwick's north terminal remained affected by the power cut, with delays to check-in and bags being loaded manually as conveyor belts had no power, while storm damage meant for a period there were no trains at all to the airport, with both Gatwick Express and Southern services suspended while repairs to the line were made. Gatwick's south terminal was operating normally.

Flood misery in sodden south-east England

17 January 2014 Last updated at 17:29 GMT

Heavy flooding has disrupted road and rail services in south-east England, will all trains suspended between Brighton and London at one stage on Monday.

In Surrey, the River Mole and the Gatwick Stream both burst their banks, flooding nearby homes.

The Environment Agency has issued 38 flood warnings for England and Wales.

Luisa Baldini reports.

Storms bring Christmas misery to southern England

Thousands of people suffer power cuts and hundreds forced from their homes as wind and rain disrupts parts of UK

ber 2013 17.51 GMT

Flooding in Maidstone, Kent after the river Medway burst its banks in the early hours of Christmas morning. Photograph: Matthew Aslett/Demotix/Corbis

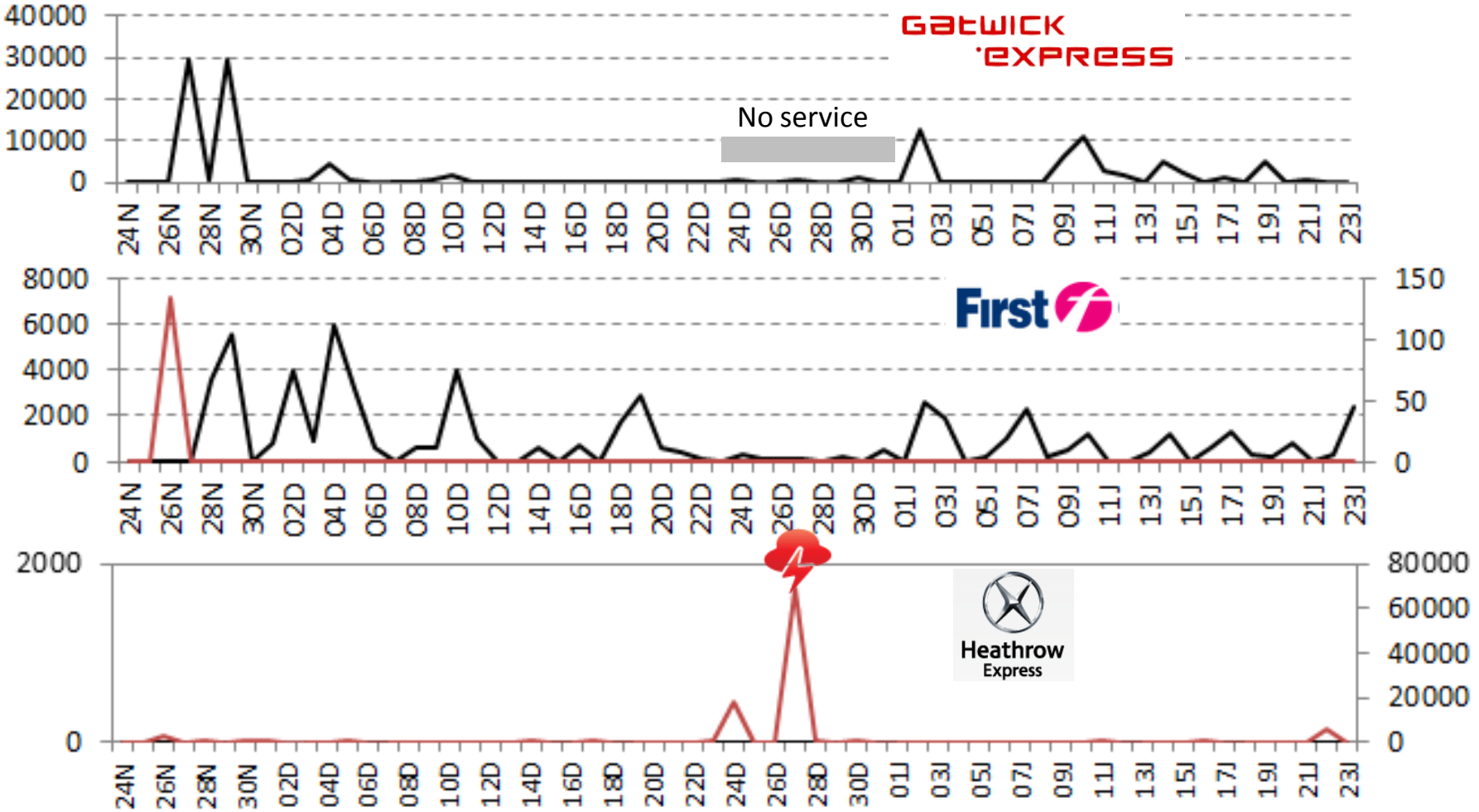
Tens of thousands of people were left without power on Christmas Day and dozens were evacuated from their homes as the stormy weather continued to bring misery and serious disruption to southern and central parts of the UK.

Some householders who were still without power in Kent, Surrey and Sussex were warned they may have to wait until the end of the week to get supplies restored.

Daily Impact in both airports by brand (I)

Heathrow

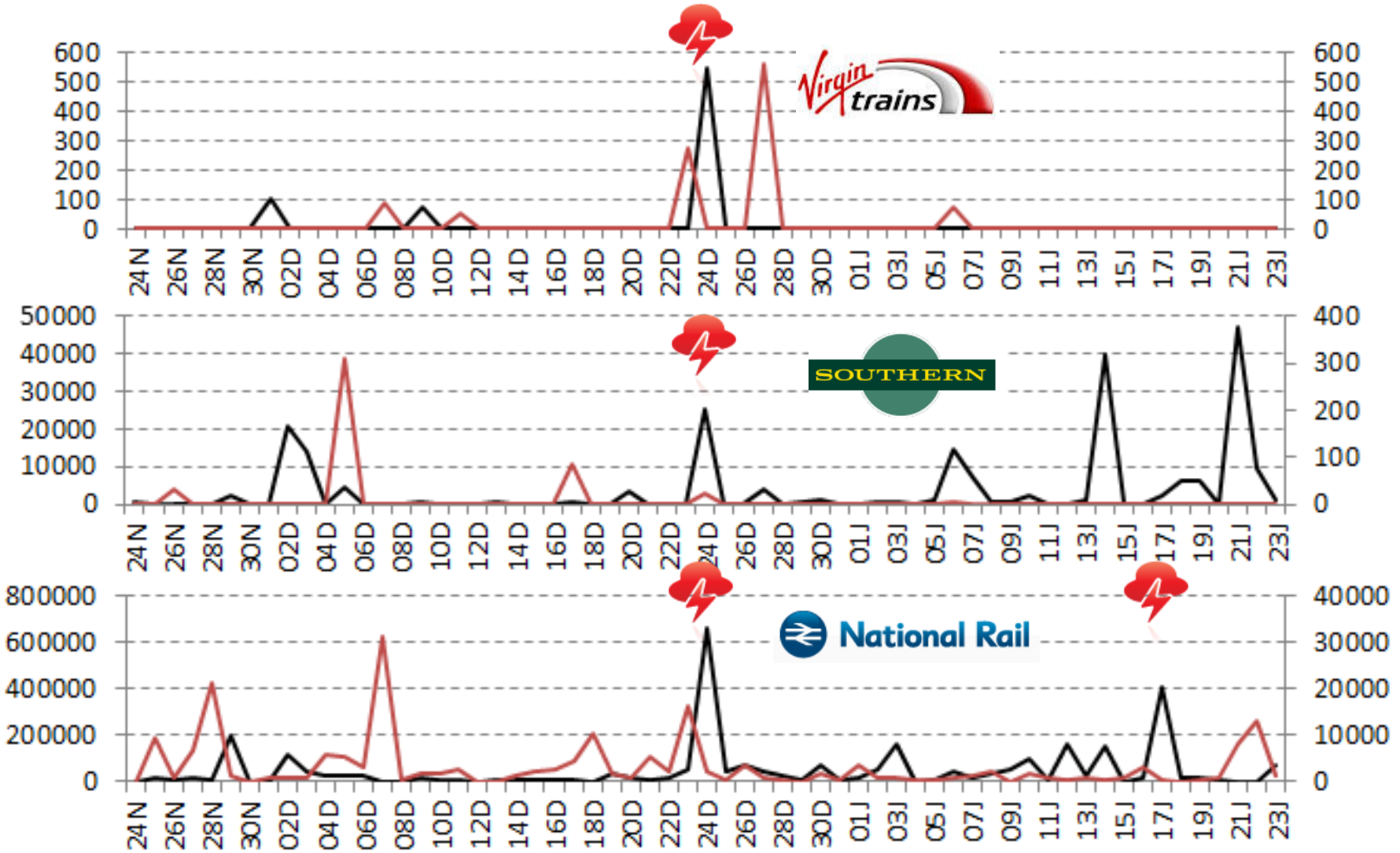
Gatwick



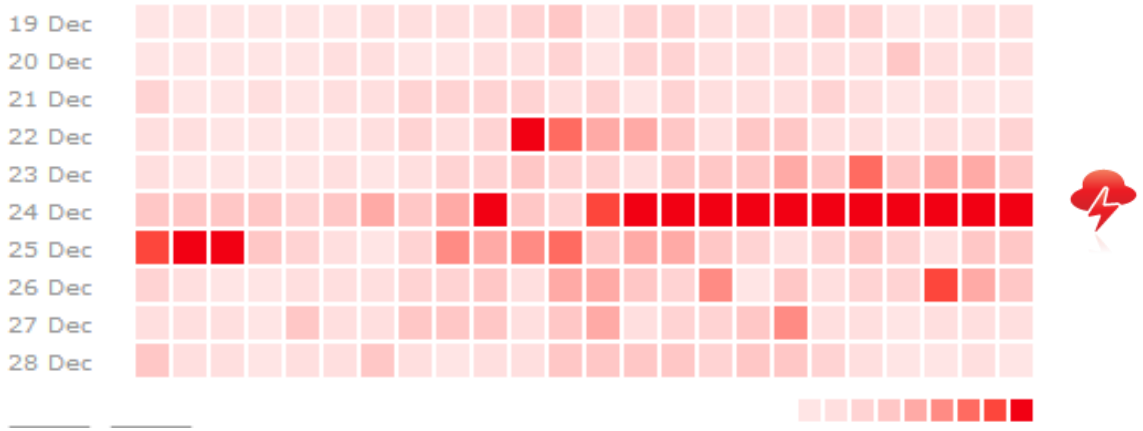
Daily Impact in both airports by brand (II)

Heathrow

Gatwick



Hourly Impact Heatmap for National Railway in Gatwick Airport



Conclusions

- Social Media is a channel to get what is in customers‘ minds anytime anywhere
- SM is a very suitable source to feed Early Warning Systems due to the fast spreading nature
- We created a framework to model the perceived impact of SM interactions in a given location on a particular brand, which can also be used on competitors.
- Our Impact modeling relies on author‘s Entity Engament Index, Differential Perception Factor and number of Exposed Users to the SM interaction
- To ease the consume of the insights in EWSs, we introduced the mapping of the output to categories

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#thankyou

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