



# Utilizing Machine Learning for Social Media Data Analysis in Disaster Management

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# INTRODUCTION



A collection of logos for various machine learning and data science tools and services, arranged in a grid-like fashion. The logos include: python, R, MATLAB, SPSS, hadoop, Spark, Azure Machine Learning, IBM Watson, theano, TensorFlow, amazon web services™, NVIDIA, and softserve experience matters.



# A number of posts on twitter related to the earthquake in Palu, immediately after the incident, is the potential valuable information for immediate rescue actions

**AHA Centre**  
@AHACentre

Follow

A second batch of the ASEAN Emergency Response and Assessment Team is on their way to Palu, together with @mapaction. Basic humanitarian needs, including clean water and WASH facility are still required. Photos were taken yesterday in West Palu by #aseanerat #1asean1response



**NASA Earth**  
@NASAEarth

Follow


Devastation in Palu After Earthquake, Tsunami  
[earthobservatory.nasa.gov/images/92836/d](http://earthobservatory.nasa.gov/images/92836/d)  
... #NASA



**Aurel's Em**  
@Aurel's\_Em

Follow

@PMBreakingNews A Vlogger who volunteered in the city of Palu told about crying the latest conditions in Petobo Village which disappeared in the bay, there were 744 houses left, estimated that there were 1000-3000 people buried. #PALUDONGGALA #IndonesiaEarthquake



**PKPU\_HI**  
@PKPU\_HI

Follow


#PALUDONGGALA

5. Kebutuhan mendesak warga terdampak saat ini: BBM, solar, premiun, makanan, air bersih, RS, tenda, terpal, selimut, pakaian, alat sholat, alat makan, alat mandi, family kit, kantong mayat, dan hygiene kit

#PaluDonggalabutuhkita #semangatpagi

5:40 PM - 7 Oct 2018

1 Retweet 2 Likes



**Michael Seger**  
@MichaelSeger

Incredible and scary #tsunami video from #Palu, #Indonesia

Through google maps I found where it was shot as multiple tsunami waves funneled north to south down a long narrow bay into Palu

Shopping district on the beach. Devastating and tragic

243 9:43 PM - Sep 28, 2018

326 people are talking about this



**Richard Woods**  
@RichardWoodsNZ

Aerial photos of #tsunami and #earthquake damage in #Palu have been released by #Indonesia's disaster management agency @BNPB\_Indonesia

49 8:44 PM - Sep 29, 2018

47 people are talking about this





# SOCIAL MEDIA

## Characteristic

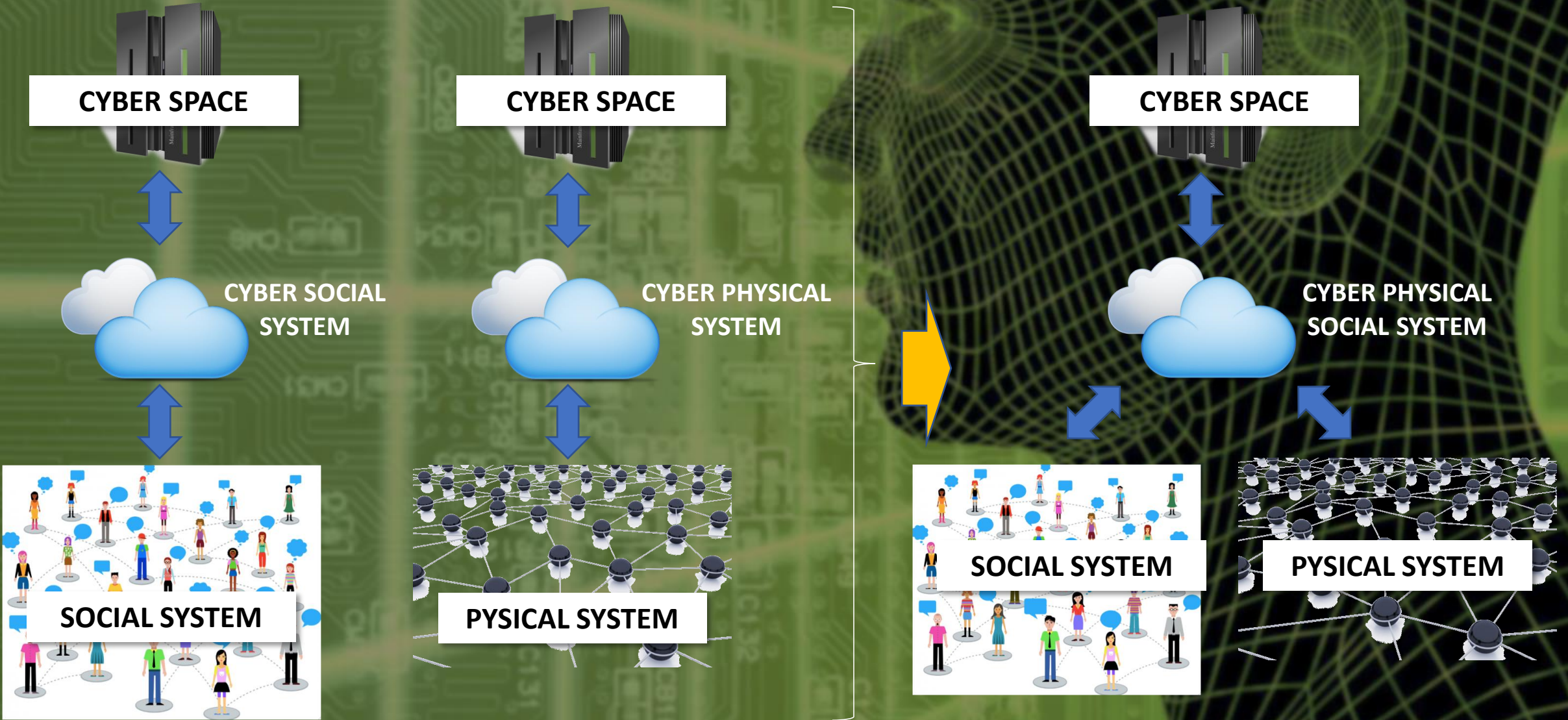
- fast, agile and flexible information
- rapid dissemination
- large amount of target audience
- wide variety of topics

➔ *Potential utilization as forefront of disaster reporting and a new way of communication to disseminate and share information of disasters.*



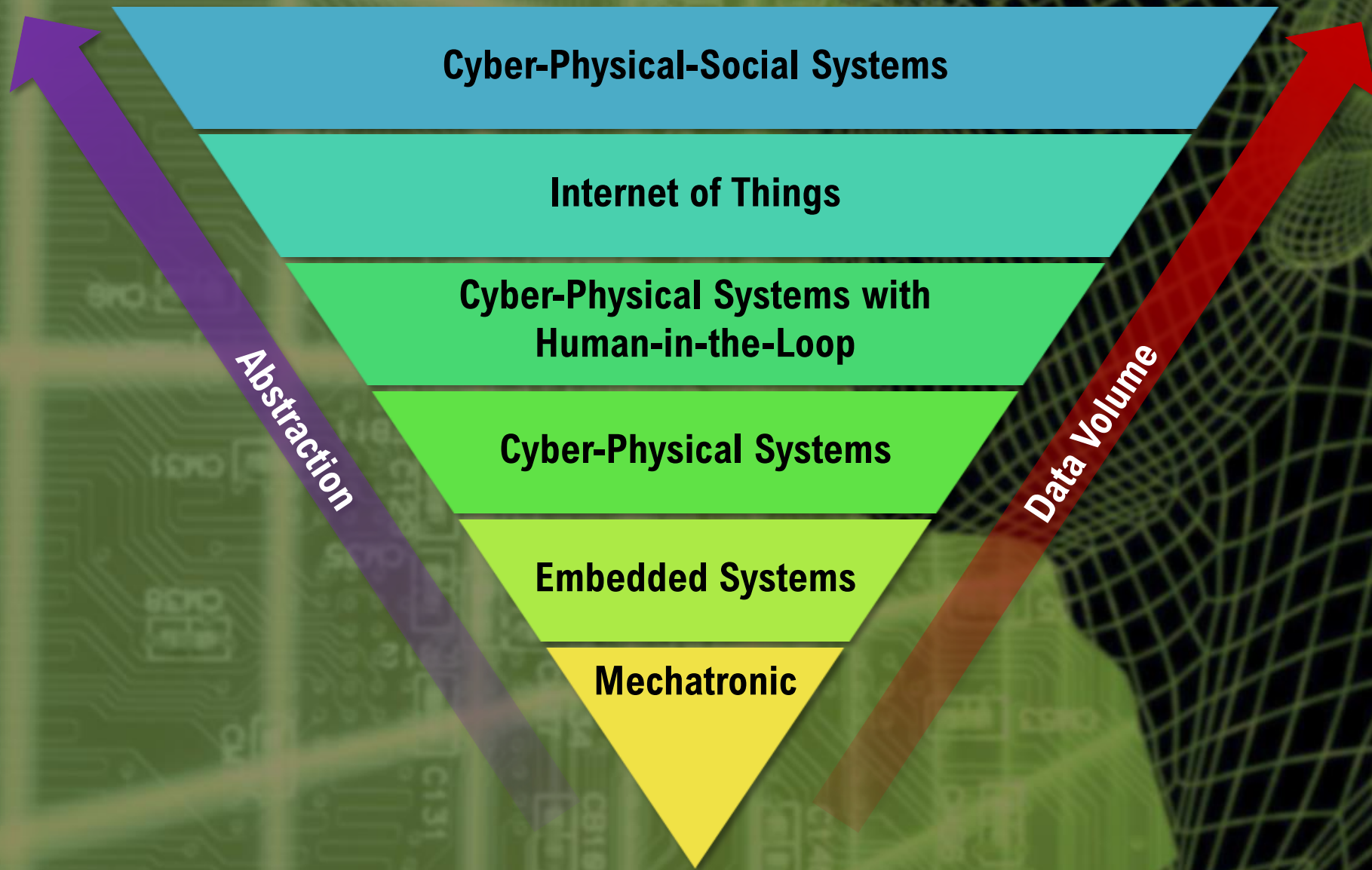


# CYBER PHYSICAL SYSTEM vs. CYBER SOCIAL SYSTEM





# THE EVOLUTION OF CYBER PHYSICAL SOCIAL SYSTEM





# OPPORTUNITIES SOCIAL MEDIA IN DISASTER MANAGEMENT



SOCIAL MEDIA PLATFORMS

- Early warning and event detection
- Situational awareness
- Actionable information
- Rapid crisis response
- Post-disaster analysis





# TOOLS REQUIRED

A hand in a light blue shirt sleeve holds a pink funnel. From the funnel, a stream of colorful alphabet letters (A-Z, 0-9, and symbols like +, %, &, @) is being poured into the air, creating a large, dense cloud of letters that fills the upper two-thirds of the frame. The background is a dark, muted grey.

- **Social Listening / Intelligence Platforms**
- **Social Media Analytics**
- **Text Analytics for Social Media**
- **Social Media Management**



## Social Media Analytics Tools – 2016 Map

### Social Listening/ Intelligence Platforms



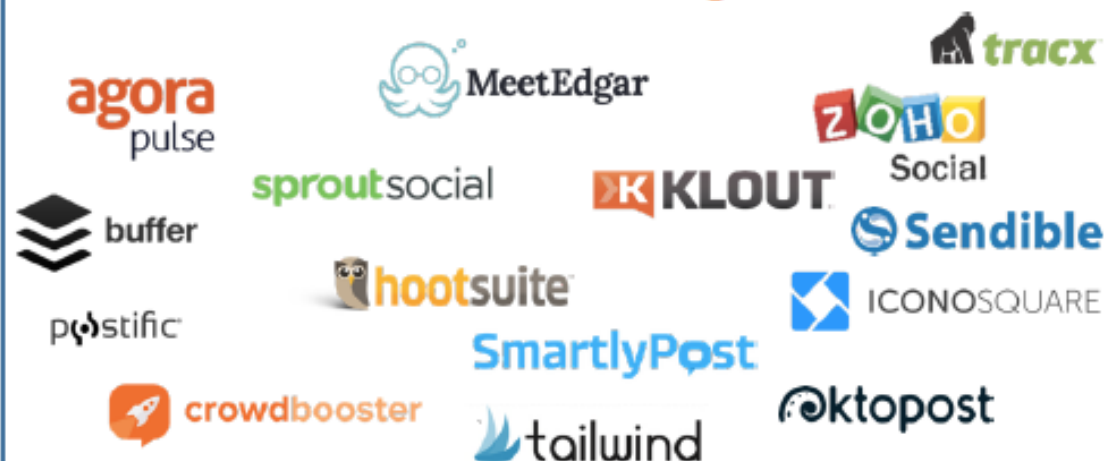
### Social Media Analytics



### Text Analytics for Social Media

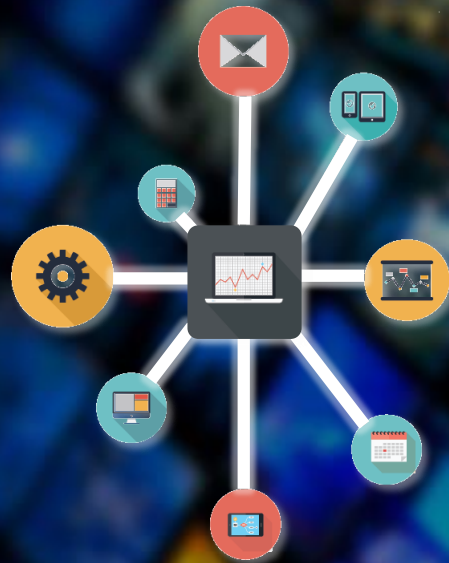
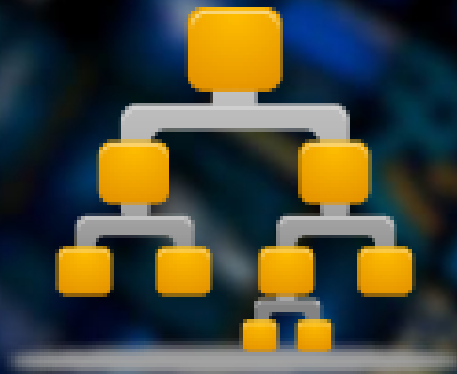


### Social Media Management





# OBJECTIVES



- To find machine learning best methods and algorithm for achieving reliable results: and valuable insight that is obtained from social media during disasters, in all four stages of disaster management : Warning, Impact, Response, and Recovery.
- To design architectural concepts of computational platform system (software, hardware and network infrastructure) for performing in real time automatic classification of crisis-related social media and crowdsourcing large-scale data at high speed.



# PROPOSED ARCHITECTURE



**Social Media Data Streaming**




A collection of social media icons including Facebook, Twitter, YouTube, LinkedIn, and others.

**Big Data Processing System**



A stack of three blue and silver database cylinders.

**Machine Learning System**



A cartoon robot holding a laptop.

**Information Portal / Web System**

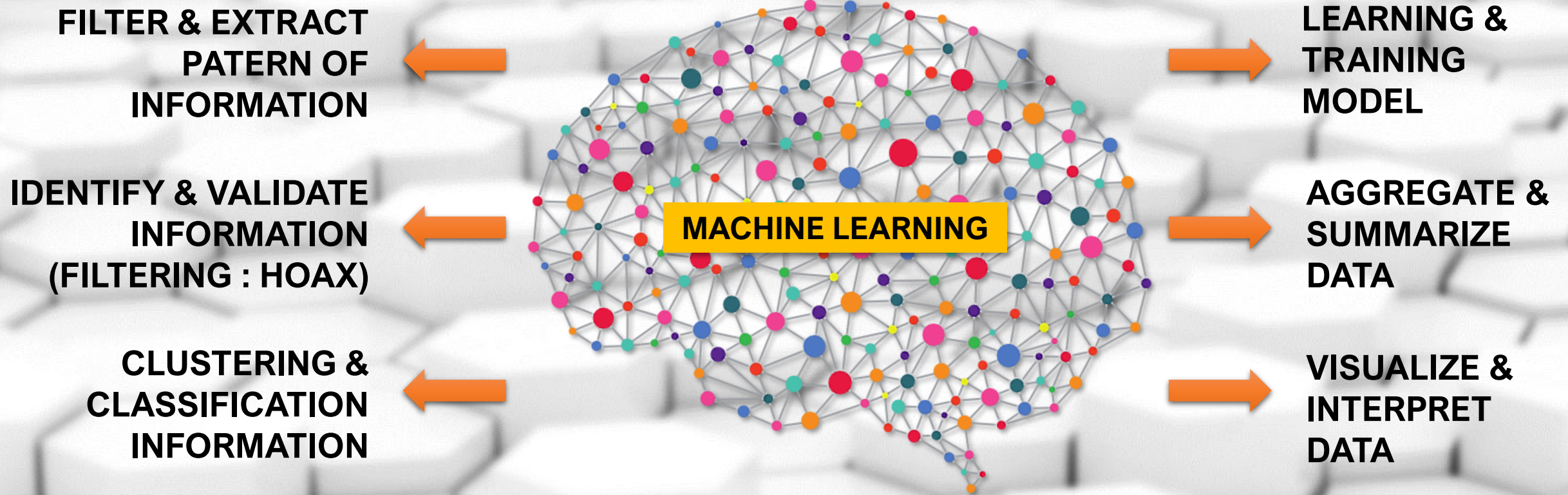


A blue gear icon with the text "REST API" inside.





# SOCIAL MEDIA ANALYSIS ALGORITHM





# PROBLEM & CHALLENGE

- **Use of Regional Language and/or dialect :**  
wanna (want to); gonna (going to)
- **Single-word slangs:** pls (please), srsly (seriously)
- **Multi-word slangs:** imo (in my opinion)
- **Misspellings:** missin (missing), ovrcome (overcome)
- **Phone2c subs2tu2on:** 2morrow (tomorrow)
- **Word without spaces:**



# RESEARCH REFERENCES



AIDR (Artificial Intelligence for Disaster Response) developed by Qatar Computing Research Institute. AIDR is a platform designed to perform automatic classification of crisis-related microblog communications.



Emergency Situation Awareness (ESA) developed by Data 61 – CSIRO Australia. ESA is a software that detects unusual behavior in the Twitter stream and quickly alerts the user when a disaster event is being broadcast.





**THANK YOU**