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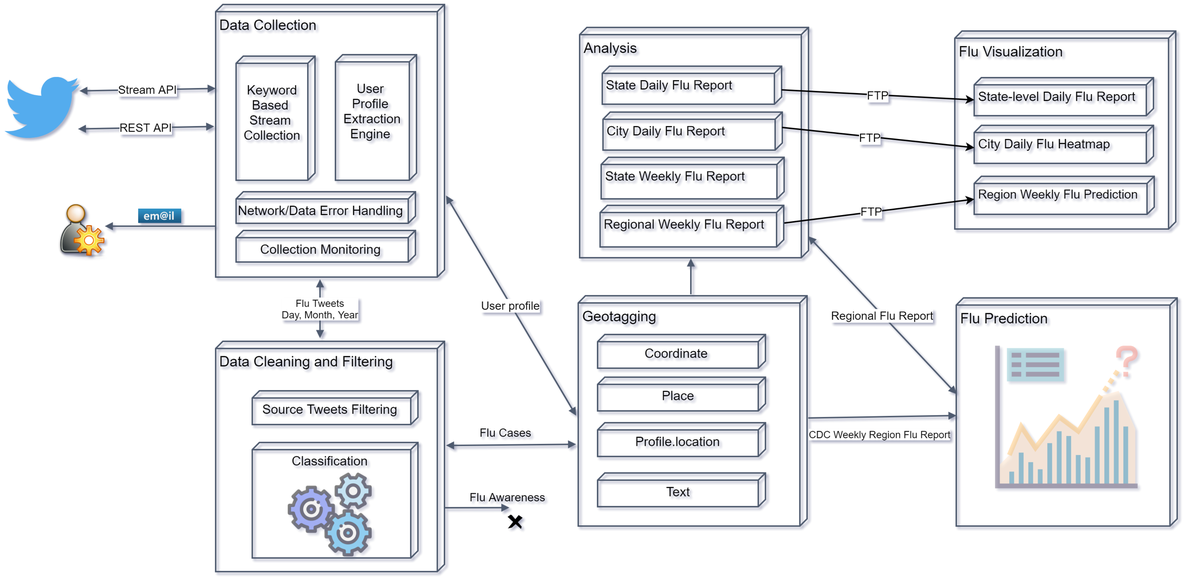
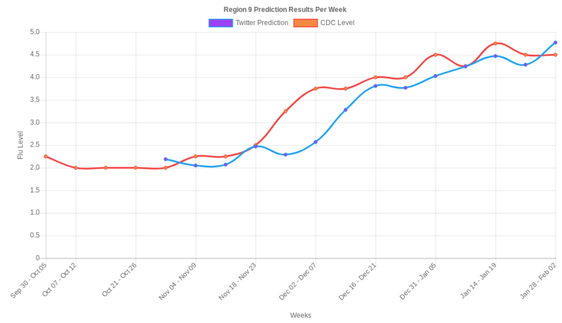
Towards Real-time Visualization of Twitter-Based Flu Report and Prediction

Introduction

The rich data generated and read by millions of users on social media tell what is happening in the real world in a rapid and accurate fashion. How to visualize the information in a way that ordinary users can understand and exploit is a challenging problem. In this project, we present our web-based visualization tools for Twitter flu report and flu trend prediction in real life. These visualization tools are integral components in a real-time social media based flu surveillance system. Our visualization tools include daily Twitter flu report at city-level, state-level, and region-level. We also animated the flu condition over user selected periods in both city-level and state-level. Furthermore, we demonstrate the effectiveness of the PDE models we proposed in our twitter-based flu surveillance system by visualizing the twitter-based flu prediction versus CDC reported flu status. All our visualization tools are automated and web-based which can be accessed through flu.academy.



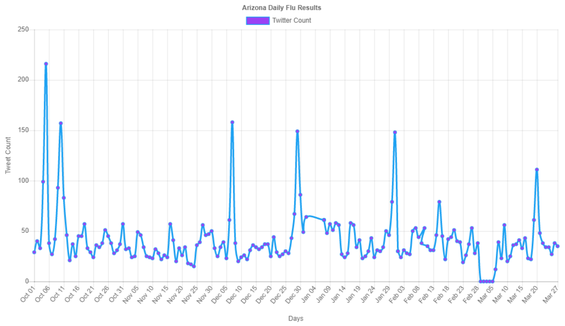
Weekly Regional Flu Prediction



Region 9 Flu prediction for the 2018-2019 Flu Season
***Region 9 is: Arizona, California, Hawaii, and Nevada

The Weekly Regional Flu Prediction graph visualizes our own Twitter based flu prediction levels against flu levels provided by the Center for Disease Control (CDC). The flu levels indicate how severe the flu is in a region over an entire flu season. Each flu season consists of weeks 40-52 of one year and weeks 1-5 of the following year. The regions are divided into ten areas of the United States (Arizona is in region nine.) The user can choose which region and or flu season they want to view.

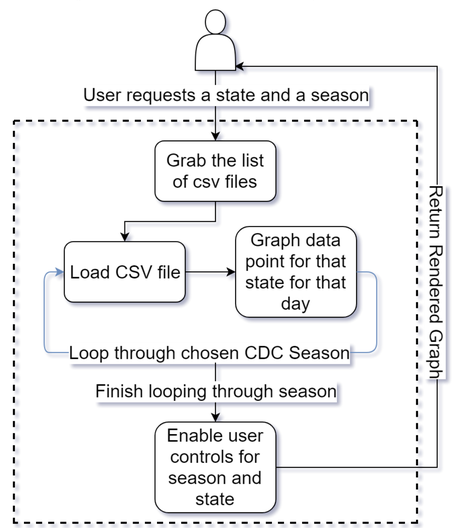
Twitter Daily State Flu Counts



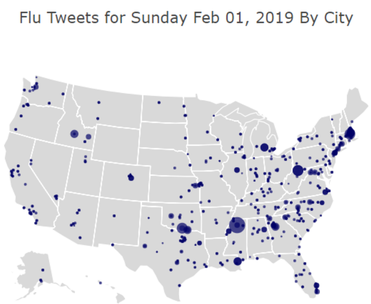
Arizona Daily Flu Counts from Oct 21, 2018 - Mar 27, 2019

The Daily State Flu Counts module is filled with the most up to date State-level Twitter Flu counts. Each dot on the graph represents one day in the CDC Season (defined below), up until the current day. The graph shows one state at a time, with the default being Arizona, with the season defaulting to the most current season number. The user can choose both the state and the season to display, from a list of all 50 states and from the collected seasons starting with 2017-2018.

***** A CDC season (displayed as year – 1, year) is defined as weeks 40-52 of the bottom year and weeks 1-39 of the top year. For example, season 2018-2019 would be weeks 40-52 of 2018 and weeks 1-39 of 2019.**

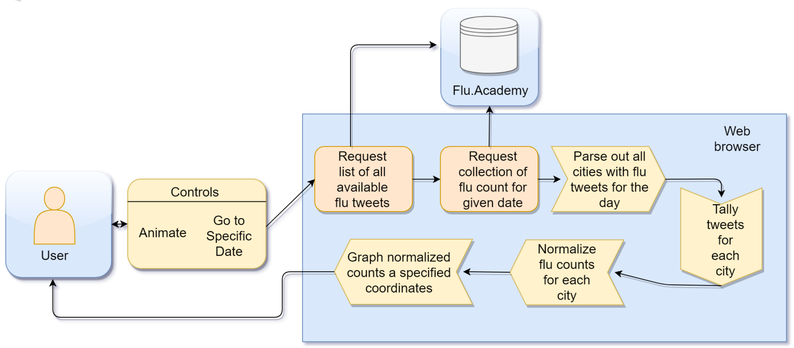


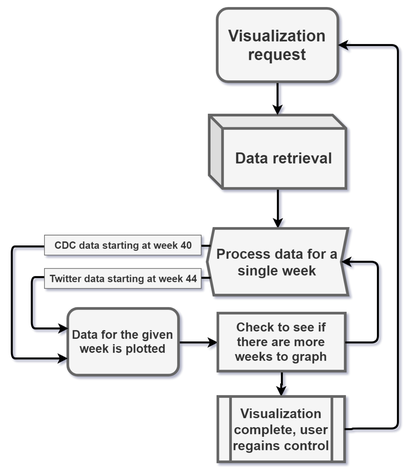
Twitter Daily City Flu Bubble Map



The Daily City Flu Bubble Map module is populated with the most recent City-level Twitter Flu counts. Each bubble on the map represents the total count of all flu tweets in a city positioned at a corresponding latitude and longitude. Each bubble is normalized by dividing the total count by the corresponding city's population as of 2017 at a rate of 2 per 100,000 (see below for details). In addition, the user can choose to view the City-level Twitter Flu counts for a specific date or animate over a range of dates.

***** Normalization is required because not every Twitter account in the United States is a personal account, nor is every personal account active, and not every active user is likely to share being ill. The normalization rate was based on the CDC's national baseline of 2.2% in conjunction with 10% of the US population which represents the number of twitter accounts in the US.**





References

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