

Delphi Epicast: Methodology

<http://delphi.midas.cs.cmu.edu>

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Overview

Epicast (<http://epicast.org/>) is a website we created where anyone can predict the wILI trajectory over the remainder of the current flu season, nationally and for each HHS region. We collect such predictions every weekend and report the aggregate of these predictions. The aggregate uses a best-fit Gaussian for distributional forecasts and the median value for point predictions.

Components

In addition to the main aggregation model, we have pre-processing and post-processing strategies to minimize surprise. Essentially we allow for small changes in previously reported values, and we assume that nothing is impossible.

Predicting The Future: Human Judgment

The weekly input from the Epicast website is a set of trajectories (one per user, per HHS region). These trajectories begin on the earliest epiweek for which wILI has not yet been reported and end after the end of the flu season. Because the three seasonside targets may have occurred in the past, we prepend to these trajectories the wILI values reported most recently (i.e. reported on the Friday preceeding forecast submission). In other words, we supplement user predictions with wILI when it is known.

Understanding The Past: Modelling Backfill

We have observed that it often takes many weeks to months for a reported wILI value for a given region on a given week to stabilize; we call this process “backfill”. Based on data provided by CDC for the 2010-2013 seasons and on data collected

automatically starting on 2014w01, we estimate for each region the wILI variance due to backfill. This backfill variance is calculated as a function of the number of weeks that have passed since the first value was published. Essentially we try to describe how wILI is likely to vary over time within each region.

Expecting the Unexpected: Uniform Blending

Even though we may strongly believe that some outcomes are impossible, we assign all outcomes non-zero probability. There are a variety of reasons why an “impossible” outcome can happen (e.g. onset week is changed due to backfill, or peak week is extremely late due to pandemic wave), and we currently enforce a minimum probability of 0.25% in weekly bins and 0.5% in wILI bins.

Summary

The dephi-epicast is formed by taking user trajectories, injecting noise on past weeks proportional to backfill variance, measuring target values on each sampled trajectory, finding the median and variance for each target, and blending final distributions with a small uniform probability.