

Entropy in Biosurveillance

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Problem

- ▶ Create a system to detect the outbreak of disease as early as possible

Entropy

- ▶ Quantifies the average amount of information received, when a given event is observed
 - ▶ We will calculate entropy based on disease incidence data
 - ▶ Previous groups were able to detect significant changes in Entropy when disease outbreaks occurred.
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Our Goals

- ▶ Create an algorithm that will determine parameters to best detect when outbreaks occur
- ▶ Determine threshold for when disease pattern should be considered an outbreak

Parameters

- ▶ Window Size
 - ▶ Step Size
 - ▶ Binning
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Window Size

- ▶ The size of the string of data which we will compute
- ▶ Will ensure the window size is large enough to detect changes in patterns, but sensitive enough to not overlook meaningful data

Step Size

- ▶ How fast the process moves through the data
- ▶ How much overlap between successive windows

Binning

- ▶ Allows us to account for differences between large and small variations in entropy readings
- ▶ Group together results with similar (although not necessarily the same) entropy to detect meaningful changes in pattern

WHY IS IT IMPORTANT?!?!?!?!?!?

- ▶ Failure to detect can lead to an otherwise avoidable increase in
 - ▶ disease spread
 - ▶ Such spread can lead to increase in the mortality rate of disease
 - ▶ Since our method only depends on amount of cases, it can be applied to natural epidemics as well as acts of bioterrorism.
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Ultimate Goal

- ▶ To create a reliable early detection method that will allow authorities to better prevent the spread of infectious diseases