BIO AWARE

PRODUCT SHEET

Detect, classify and model disease outbreaks ahead of traditional means

OVERVIEW

BioAware is an advanced biosurveillance data fusion and forecasting system being developed by Riskaware for defence, military, environmental and large commercial applications. It combines information fusion and dynamic models to deliver optimised, accurate and efficient biosurveillance services.

The BioAware programme aims to provide the ability to track and forecast the behaviour of diseases, equiping users with superior situational awareness and allowing for quicker deployment of resources and improved infection spread mitigation.

BioAware uses advanced statistical algorithms to determine the presence of an outbreak, identify it, and then estimate the number of infected people. It combines a multi-disease compartmental model, a particle filter and a Bayesian network to optimise result accuracy and minimise false alarms.

CREDENTIALS

At the core of BioAware is the Bio-Surveillance Data Fusion algorithms. These advanced algorithms are designed to probabilistically fuse data from multiple data sources in order to infer the number of people at each stage of infection and the presence of any outbreaks.

Key to success is the algorithm's ability to approximate the probability samples generated from the sum of multiple non-identical distributions. This allows BioAware to account for the effects of misdiagnoses in observations.

BioAware's novel application of particle filters to epidemiology potentially opens the door to other applications, such as the early prediction of the likely demand for drugs and immunisations, based on product sales data.

COMPARTMENTAL MODEL

BioAware's algorithms capture the relationships between disease stages and healthcare seeking behaviour using multi-disease compartmental models.

- The system compares healthcare facility observations and other real-world data with hundreds of working hypotheses about an infection's status and characteristics
- The compartmental model can then be used to generate forecasts of the likely future behaviour of the infection

BAYESIAN NETWORK

The BioAware algorithm uses Bayesian networks to account for environmental attributes that could cause anomalies or false alarms. Key factors include:

- How days of the week affect the probability of individuals visiting a medical professional
- The effects of the number of daylight hours and relative humidity on the pairwise infectious contact rate for the flu

PARTICLE FILTER

At the core of Riskaware's biosurveillance system is a Sequential Monte Carlo (SMC) algorithm, or particle filter.

- Infers the population of each compartment within the model and whether any disease is currently in an outbreak mode at any point in time
- Calculates the number of people in each compartment and their probability of an outbreak

PROGRAMME BENEFITS

Automated detection and classification of outbreaks ahead of diagnostic testing

Increased situational awareness through infected population estimates

Reduction in false alarms through the fusion of multiple data sources and by accounting for known patterns in healthcare seeking behaviour

Forecasting of disease spread to aid the planning of disease intervention

Faster, strategic responses and interventions to potential disease outbreaks

ABOUT RISKAWARE

Riskaware is a leading incident modelling solutions provider. With over 20 years' experience working with global government departments and science-led R&D partners, we deliver actionable insight on environmental, human and security challenges worldwide. Our scalable incident modelling platform solutions offer superior situational awareness and critical decision support to government and commercial organisations.

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