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- Proposed Title: Hidden-Markov Model on Detection of Suicide Outbreak
- Proposed Short Title: HMM on Suicide

Abstract:

Suicide is one of the leading causes of deaths and the rate of suicide is increasing worldwide. Suicide can be contagious and result in outbreak, specially in adolescents or younger adults. In this study, we present an automated detection of suicide outbreak among the general U.S. population. The suicide rate is high in Spring/Summer months in the U.S. In this study, we use the Hidden Markov Model (HMM) to distinguish the hidden dynamics (outbreak or not) in the incidence of suicide. We have 145 monthly time-series data points on the cases of suicide in the U.S. during 1999-2014. The data is obtained from The National Center for Health Statistics (NCHStats), which is publicly available online. Therefore, no ethics approval is required to work on this dataset. A simple line diagram shows that the suicide rate is increasing over time in U.S. There is also seasonality present in the data, since the data is obtained on a monthly-basis. In Statistics, very small data leads to unreliable fit to the real data and very big data leads to overestimation. HMM can be used in such instances for a reliable fit. HMM will help to determine the outbreak without the need of considering seasonality and trend effects of the time-series data. The automated detection will help the law-enforcement authority, health-care providers or policy makers to predict the outbreak and work towards decreasing the outbreak of suicide in the U.S. There is a possibility to obtain data on suicide attempts and suicide ideation, both from Canada and Australia. The model built in this study using the data from the U.S. can be tested in other populations to illustrate the utility of the model.