Chapter 1

Introduction

Contact tracing is a non-pharmaceutical intervention that aims to halt the spread of infectious disease by identifying and quarantining individuals that have been in close physical proximity with the infected [3, 5].

In response to the pandemic of coronavirus disease 2019 (COVID-19) [4, 6, 7],

Effective contact tracing is inherently difficult because of the complex interactions between epidemiology, public health, ethics, politics, and sociocultural norms [3].

A common design element across all of the aforementioned contact tracing methodologies is that they only consider direct interactions between users. While there are privacy benefits to this approach, a major limitation is that they cannot utilize information about indirect contact to more effectively reduce the spread of disease. ShareTrace addresses this limitation by constructing a factor graph and estimating infection risk via a message-passing algo-

rithm. As such, this work labels the ShareTrace algorithm as *risk propagation*. The first work on ShareTrace was a white paper that focused on the motivation, design, and engineering details. Exclusive to Ayday et al. [2] is a discussion on privacy, network roaming, protocol interoperability, and the usage of geolocation data. Furthermore, it includes detail on the system model and data flow. The second work on ShareTrace [1] formalizes the algorithmic details in a centralized setting and demonstrates its improved efficacy, compared to the framework developed by Apple and Google [**AppleGoogle**].

Higher-order contact tracing has demonstrated increased efficacy [5]

Bibliography

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