**Tick Talkers**

Forecasting the Impact of Climate Change on Lyme Disease Proliferation

**BACKGROUND**

With the anticipated rise in temperatures resulting from climate change, ticks - known carriers of certain diseases - may become more active in Germany in the coming years. If people are not careful and fail to take appropriate precautions to protect themselves from tick bites, the risk of contracting tick-borne diseases such as Lyme borreliosis may increase, leading to more people becoming affected by these illnesses.

**RESEARCH QUESTION**

How do climate change-induced factors, such as elevated temperatures and human-related activities impact the proliferation of ticks and the subsequent prevalence of Lyme disease in Bavaria, Germany?

**RESEARCH GOAL**

Our aim is to devise, by the conclusion of TUMAJA, a robust predictive model that demonstrates a non-trivial degree of accuracy with errors contained within an acceptable margin, establishing correlations between climate change-driven factors and human activities, and the incidence of Lyme disease in Bavaria. This model will serve to potentially enhance the preparedness and response of pharmacies and medical services by capitalizing on the available data and concentrating on the endemic region.

**DELIVERABLES**

A comprehensive, peer-reviewed research paper, accompanied by a sophisticated predictive model visualization and an interactive application designed to effectively disseminate our findings and facilitate knowledge transfer.

**HIGHLIGHTS UPDATES**

**Multi-Modality Implementation**

Introduction of a multimodal model, designed to accept input variables encompassing temperature, humidity, and land usage.

**Interactive Map**

Design of the first prototype of our interactive map, which will provide users a risk level of infection based on Landkreis. Different scenarios showing the climate change will be considered.

**MODEL ILLUSTRATION**

- **INPUT**
  - Temperature
  - Humidity
  - Land Usage
  - Host Density
  - Human Population
- **OUTPUT**
  - Prediction of Tick-borne disease incidence

**BIOLOGICAL INFORMATION**

**RESEARCH HIGHLIGHTS**

- **Identification of research gap**
  - Previous regressive models study the correlation between the interaction of climatic and human activities with vector borne diseases, in which a specie of tick is a vector host. However, there are no prediction models.
  - The most recent regressive study took place in 2018 in the state of Vermont, USA [1] or the migration of tick species through whole Europe [2].
  - We are bridging the gap by developing a predictive and regional model.

- **Expanding our network**
  - **Journals**: Listing of publication requirements (Tentative Journal: Mary Ann Liebert Journal)
  - **Contact**: Phanification of an strategic contact with key players such as the bavarian health state office (Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit) and the chair of Epidemiology, part of the department of Sport and Health Science at the Technical University of Munich.

**TIMELINE AND MILESTONES**

- **OCT 2023**
  - **Members**: Franka Exner
  - **Tutors**: Leonardo Giannotti, Daniel Khadra
  - **Supervisors**: Prof. Dr. Niklas Fanelsa, Prof. Dr. Enkelejda Kasneci
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Bibliography
