ILE Research Spring 21
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Written statement/abstract of the scope of the research project/learning outcomes:

For **ILE Research Spring 21,** I am researching how wildfires and other fire emissions impact air quality and the economy. Prof. Thilanka Munasinghe is advising me on this project. I aim to finish the project by May 15h 2021. Outcomes/deliverables are a research paper possibly published at a conference, and a personally hosted site, i.e., a GitHub page, where I will display the research paper.

There is much existing scientific literature applicable to my project. There are two general categories. First, the impact of fire emission on air pollution, and second, the impact of air pollutants on human health, such as PM2.5/O3/NO2 on asthma incidence. The dependence of these two categories suggests further analysis to connect fire emissions to human health quantitatively. Subsequently, given healthcare costs, I plan to analyze the impact on the economy as a part of this study. Property damages directly resulting from wildfires may also be factored into the analysis.

This study's initial hypothesis is: Wildfires contribute to PM2.5/O3/NO2 levels, thus increasing the number and associated costs of respiratory/cardiovascular-related hospital admissions and emergency room visits.

The goal is not to perform research from scratch. Instead, the goal is to build upon existing research work (listed below) coauthored by researchers from NASA and NOAA by applying appropriate machine learning and statistical learning methods and implementing models. To achieve this goal, I will utilize the knowledge that I obtained from my completed courses, mainly *Data Science* and *Machine Learning from Data*.

I intend to use datasets from NASA and NOAA that are publicly accessible and the public datasets listed (next page) during this study. The existing research work uses many of these datasets.

I will be meeting with Prof. Thilanka Munasinghe every 1-2 weeks to make sure I am pacing myself properly with the project work and correctly implementing machine learning and statistical learning methods. Currently, I have met with Prof. Munasinghe and set up the initial research work under his supervision.

Applicable existing research work:

- [Remote Sensing | Free Full-Text | Impact of Fire Emissions on U.S. Air Quality from 1997 to 2016–A Modeling Study in the Satellite Era | HTML (mdpi.com)](#)
- [Vegetation fire emissions and their impact on air pollution and climate - ScienceDirect](#)
- [Estimates of the Global Burden of Ambient PM2.5, Ozone, and NO2 on Asthma Incidence and Emergency Room Visits | Environmental Health Perspectives | Vol. 126, No. 10 (nih.gov)](#)
- [Impact of Fine Particulate Matter (PM2.5) Exposure During Wildfires on Cardiovascular Health Outcomes | Journal of the American Heart Association (ahajournals.org)](#)
- [The relationship of respiratory and cardiovascular hospital admissions to the southern California wildfires of 2003 | Occupational & Environmental Medicine (bmj.com)](#)

Sources of datasets:

- [Global Fire Emissions Database (globalfiredata.org)](globalfiredata.org)
- [Biogenic Emissions Landuse Database, Version 3 (BELD3) | Air Emissions Modeling | US EPA](#)
- [National Interagency Fire Center (arcgis.com)](arcgis.com)
- [Air Data: Air Quality Data Collected at Outdoor Monitors Across the US | US EPA](#)
- [Air Pollutant Emissions Trends Data | Air Emissions Inventories | US EPA](#)
- [Remote Sensing Information Gateway | High-End Scientific Computing | US EPA](#)