Carbon Monoxide Poisoning Risk in U.S. Households

Carbon Monoxide or CO poisoning is a dangerous condition that can cause serious tissue damage, or even death.[1] Many U.S. households are at risk of CO poisoning due to the use of fuel-burning appliances inside the home. We aim to uncover the trends and risk factors associated with CO poisoning in U.S. households.

The U.S. Census Bureau's 2017 American Housing Survey (AHS) is a housing survey that collects information on a wide range of housing subjects, including characteristics of U.S. housing inventory.[2] The dataset contains over 66,000 responses from U.S. households and it contains features about the type of heating fuel used in a home, the presence of a CO monitor, demographic data, geographic information, and over 3000 other topics.[3] The data itself is encoded according to a predefined data dictionary and there are some missing values we will need to remove or interpolate.

Logistic regression and classification algorithms will be useful for analyzing the dataset so we can obtain probabilistic outcomes and find similar groups of data from the survey. Python will be the main tool to perform this analysis because it efficiently handles large datasets and a significant number of packages are available for data science work.

We also plan to obtain outside information from the Consumer Product Safety Commission (CPSC), CSA Group product standards, and other reports about CO poisoning. The CPSC and CSA group develop guidelines and standards for safe management of CO in homes, but no analysis of at-risk U.S. households has been performed yet.

The performance of our results will depend on the significance and reliability of our models. Confusion matrices, error between training and test sets of data, and statistical significance of the models will help to determine result performance.

A rough schedule is included below:

October 22-November 6: Exploratory Data Analysis and Pre-Processing
November 7-November 20: Modelling and UI design
November 21-December 3: Review and develop presentation.

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[1] Carbon monoxide poisoning. 2019. Mayo Clinic. Accessed from https://www.mayoclinic.org/diseases-conditions/carbon-monoxide/symptoms-causes/syc-20370642
[2] About this Survey. 2019. American Housing Survey (AHS). U.S. Census Bureau. Accessed from https://www.census.gov/programs-surveys/ahs/about.html
[3] The full 2017 AHS dataset can be accessed at https://www.census.gov/programs-surveys/ahs/data/2017/ahs-2017-public-use-file--puf-/ahs-2017-national-public-use-file--puf-.html