PHASE 1: Paper

Title: "Indoor Overheating Risks: A Cross-Building Analysis Using Seasonal Building Overheating Index and Humidex"

Scope: Overheating in naturally ventilated apartments in Toronto

Methods:

- 11 buildings (YWCA, KS, TCH (7 buildings), Modern and Ivory)
- SBOI and Humidex

Aim

- Assess how certain building characteristics could lead to greater vulnerability and evaluate Humidex deviations indoors vs outdoors.

Methodology: Calculate SBOI and Humidex (both indoor and outdoor, then compare)

Results:

- % of summer hours above 26,28,30 celsius (provides evidence that overheating risk is present)
- Show SBOI by summer month and by building and compare
- Heatmap plot to show Humidex of buildings (using indoor temp and RH) and compare with heatmap of humidex of indoor temp
    - For a building with poor insulation, humidex indoors deviated by a factor of X from outdoor Humidex
    - For a building high-rise building, humidex indoors deviated by a factor of X from outdoor Humidex
    - Etc
- Plot outdoor temperature vs indoor temperature time series for selected suits and calculate correlation coefficients between outdoor and indoor temps per building

Discussion:

- Which buildings overheated most and why
- How well outdoor metrics predicted indoor discomfort

PHASE 2: App development: indoor overheating risk forecaster

- Uses outdoor weather data (temp and RH from NOAA or Environment Canada?)
- Asks user for building features
    - City/Town (to auto-pull nearest weather data)
    - Building type (low/mid/high rise)
    - Insulation level (good/poor)
    - Windoor to wall ratio (low/medium/high)
    - Orientation (optional)
    - AC presence (yes/no)
- Based on paper findings, these characteristics would increase of decrease overheating risk during the day
- By default, outputs Humidex daily plot of outdoor forecasted data and once indoor characteristics are added, plot secondary, indoor risk plot
- Returns daily risk of indoor overheating plot
    - < 29, normal = green
    - 29-34, some discomfort = yellow
    - 35-39, dangerous = orange
    - 40+, medical emergency = red
- Add percentage of hours above X degrees Celsius

➔ Behind the scenes

- ◆ Train model to plot predicted indoor temperatures based on outdoor temp and RH