Data Analysis of Pedometer Steps

Sheridan Kamal, Merissa Lissade, Tova Schwartz

INTRODUCTION

MOTIVATION:

Exercise is the **modern panacea**:

The cure to **obesity**, some **heart diseases**, and many **mental health** conditions.

America has an obesity epidemic, causing a surge in type II diabetes (especial among children), and heart disease is the number one cause cause for death in America.

Reason: Stationary lifestyle and poor eating habits

We decided to focus on the first half of the equation: **exercise** and **inactivity**.

DATA

Personal step data extracted from the Apple Health App.

Daily temperature data obtained from the NOAA website.

Time-series Analysis: Daily for June 1st, 2019 to September 29th, 2019

QUESTIONS AND PURPOSE

We chose to analyze **walking**, a free form of exercise, and its **relation to time and temperature**.

Questions:

How elastic is activity level to the daily temperature?
How fixed is our daily routine?
Does our weekly activity level reflect our weekly schedule?

Hypotheses:

Since the data is from the summer months, we hypothesized that **higher temperatures would lead to lower levels of activity**.

We also hypothesized that our step activity would follow a **weekly cyclical trend** that would mirror our weekly schedules.

Related Works

Richardson et al. 2008

- Relationship between activity levels and weight loss
- 73% women, 27% men

Baskerville et al. 2017

- Relationship between activity levels and HbA1c levels in people with Type 2 diabetes
- Pedometer use increased activity levels

Le Masurier et al. 2005

- Analysis of activity levels in children (1046 females, 793 males)
- Relationship between age and activity level and gender and activity level

Member’s Contribution

All members jointly contributed to the paper.

Sheridan Kamal - Visualization 1, Slides

Merissa Lissade - Visualization 2, Demo / Video

Tova Schwartz - Visualization 3, Presenter

METHODOLOGY

1st VISUALIZATION

A **scatterplot** of the **relationship between temperature and daily steps**.

No clear correlation.

When analyzed with a regression it was found that Merissa's and Tova's activity had a slightly positive relationship with temperature, while Sheridan's activity had a slightly negative relationship with temperature.

Colored by person's data.

Selection interaction with other visualizations, allows focus on selected temperature range and selected individuals data.

2nd VISUALIZATION

Small multiple of scatterplots for weekly steps data.

We chose this visualization because the subplots allow us to compare various weeks to determine if there is a pattern between them. It was determined that there was **no cyclical weekly pattern in activity**.

Colored by person's data.

Selection interaction with other visualizations, allows focus on selected individual's data.

3rd VISUALIZATION

Time-series scatter plot of daily steps, color coded by daily temperature.

This visualization was chosen because it shows us the temperature of that day and the steps taken so that we could determine if days with higher temperatures resulted in lower activity levels or vice versa. It was determined that there was **no relationship between activity and the temperature.**

Colored by daily temperature

Selection interaction with other visualizations allows: focus on selected time range and selected individuals data. Zoom on certain dates and time scrolling interactions also available.

DEMO


Everyone's Steps
Steps by temperature
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Day
Steps

CONCLUSION

RESULTS

Our hypotheses were proven **wrong**:

Temperature is **not** significantly correlated with activity level.

Weekly activity does **not** follow a cyclical weekly pattern.

But...

LIMITATIONS

There are many limitations to our analysis:

Failure to take into account **location** - continued research would involve using location data

Small **sample size** - continued research would involve a much larger sample size

Limited **time range** - continued research would include a longer time frame

Gender (all female group members) - continued research would look at both genders and determine if there are differences in the activity levels with respect to temperature between the two genders

THANK YOU!