Cognitive Walkthrough

A think-aloud with the COVID-19 Analytics Team

INTRODUCTION

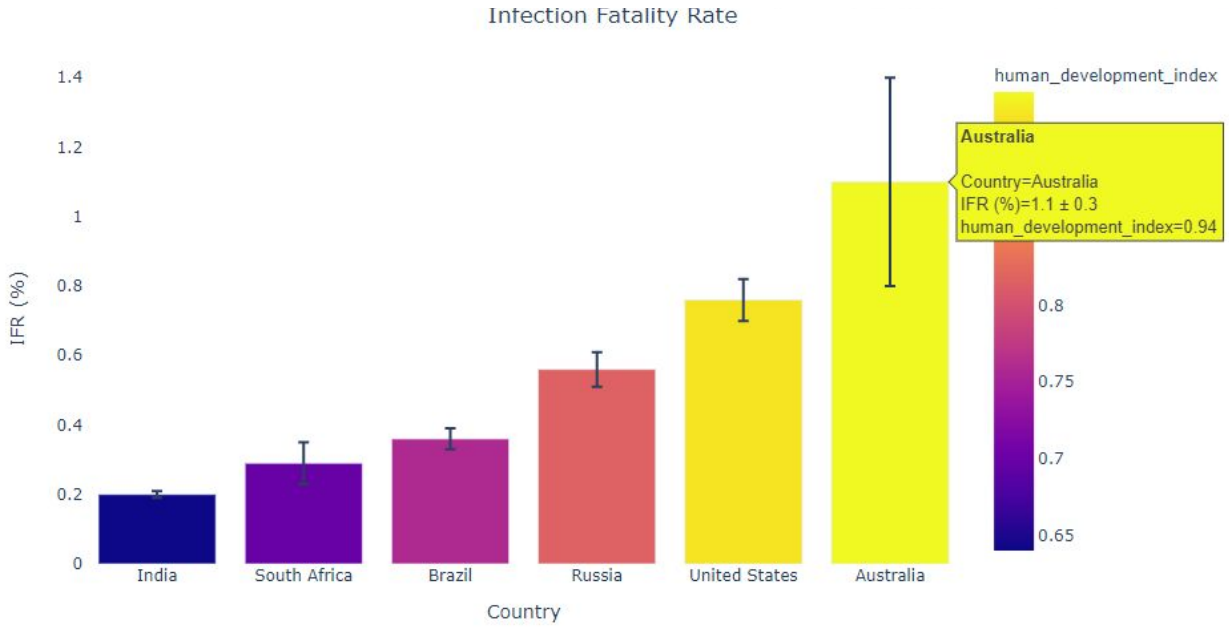
The purpose of the think-aloud was to understand the existence of multiple mental models and evaluate the learnability of our graphs.

THE PROCESS

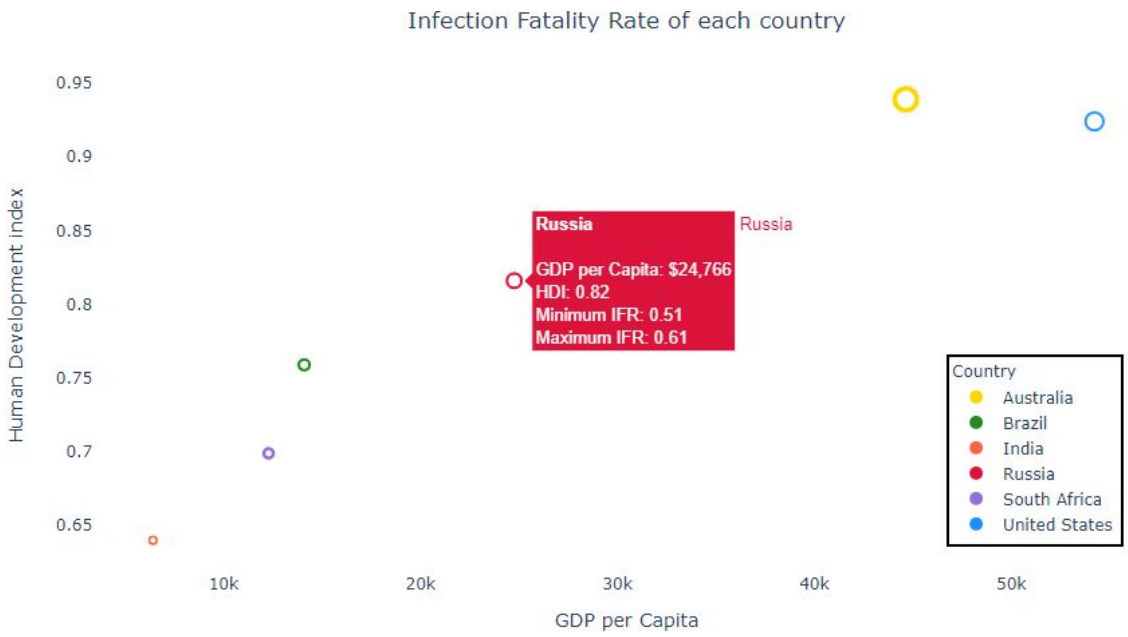
In this section are the five think-aloud observations that were conducted with five different participants. The participants were chosen based on the stakeholders of our results and availability. These participants include: a data science student, a business and IT student, an older person with no science background, business student and an education student.

The participants were shown two graphs (these were the first graphs shown to participant 1) :

1. The first is a bar graph showing a relationship between the human development index and infection fatality rates (with 90% confidence intervals) by countries



2. The second as a scatter plot showing the correlation between GDP per capita and human development index on the infection fatality rates (with 90% confidence intervals indicated as the width of the marker rings) for each country



Transcript of what was read to the participants.

“Hi [insert name]. You have been invited to a cognitive walkthrough in which you will be provided a scenario and would like for you to think aloud based on what you see. Does this make sense?”

“This is your scenario:

You are interested in understanding how deadly covid is. You've seen some death rates and visualisations in the media and in articles and realised a lot of different sources give you different numbers and visualisations that don't compliment each other. You stumble across two plots. What are your observations and understandings from these visualisations and does this help to solidify some of your earlier confusions?

Does this make sense?”

“You can take control of the mouse and hover over the plots for more results.”(Added: 14th Nov 8:00pm)

[Begin Think-Aloud]

[End Think-Aloud]

“Thanks for your time!”

THINK-ALOUD OBSERVATIONS

Think Aloud 1:

Date	Duration	Experimenter	Participant Description
12th Nov	5 minutes	Cynthia Mather	Student with Data Science Background

Visualisation	Observations	Changes made after think aloud
Bar plot	● Clearly see IFR is really low in India, supposed to be higher in aus, for countries with lower human development index, lower IFR, more confused about how deadly Covid is. ● Problems when operating interactive graphs when resetting the graph. ● “Alot of colours, so not confusing”	● Added sub headings to explain graph
Scatter plot	● Seems confused about what the graph is doing ● “Using that to show the uncertainty is pretty smart” ● “A very good graph can be used in many scenarios but don't know what the graph wishes to demonstrate” ● “Have an explanation about what different dot size means.”	● Added sub headings to explain graph (especially the markers)

Think Aloud 2:

Date	Duration	Experimenter	Participant Description
14th Nov	8 minutes	Sherry Wang	Student with Business and IT Background

Visualisation	Observations	Changes made after think aloud
Bar plot	● "It is too colourful and confuses me, it can be distracting" ● Identified that Australia is the worse off in terms of IFR ● "How is Australia's Infection rate worse than India? I think the first 3 countries are third world countries that don't conduct good data so i think it's not accurate." ● "What is the black bar? I think it is an estimation" ● What is human development index	● Didn't change colours as it took into consideration colour sensitivity and colour blindness
Scatter plot	● Hard to understand without any context ● Determined that each donut has different size and thickness ● "Will be better with a grid, it will be easier to read"	● Added a grid

Think Aloud 3:

Date	Duration	Experimenter	Participant Description
14th Nov	15 minutes	Cynthia Mather	Older person with no science background

Visualisation	Observations	Changes made after think aloud
Bar plot	● Difficulty reading small subheadings ● "What is CI? Covid Infection?" ● Confused that Australia is higher, thought india should be higher ● Liked the colour scheme	● Increases size of subheadings
Scatter plot	● "Lot harder to read, it is less straightforward than the first graph" ● Knew they had different widths ● Understood the variance of IFR is the width of the rings ● Some points a little too small i.e. India	● Increases scale of markers

Think Aloud 4:

Date	Duration	Experimenter	Participant Description
14th Nov	6 minutes	Johnson Yun	Student with Business Background

Visualisation	Observations	Changes made after think aloud
Bar plot	● Have no idea about what IFR is and how it is calculated ● "What does confidence interval mean?" ● Confused about what those lines mean ● Wish to have a clear presentation about the correlation between IFR and human development index	● Improve titles
Scatter plot	● Can figure out there is a correlation between GDP and human development index ● Confused about what the ring size means ● Likes the gridding	● Improve subheading descriptions

Think Aloud 5:

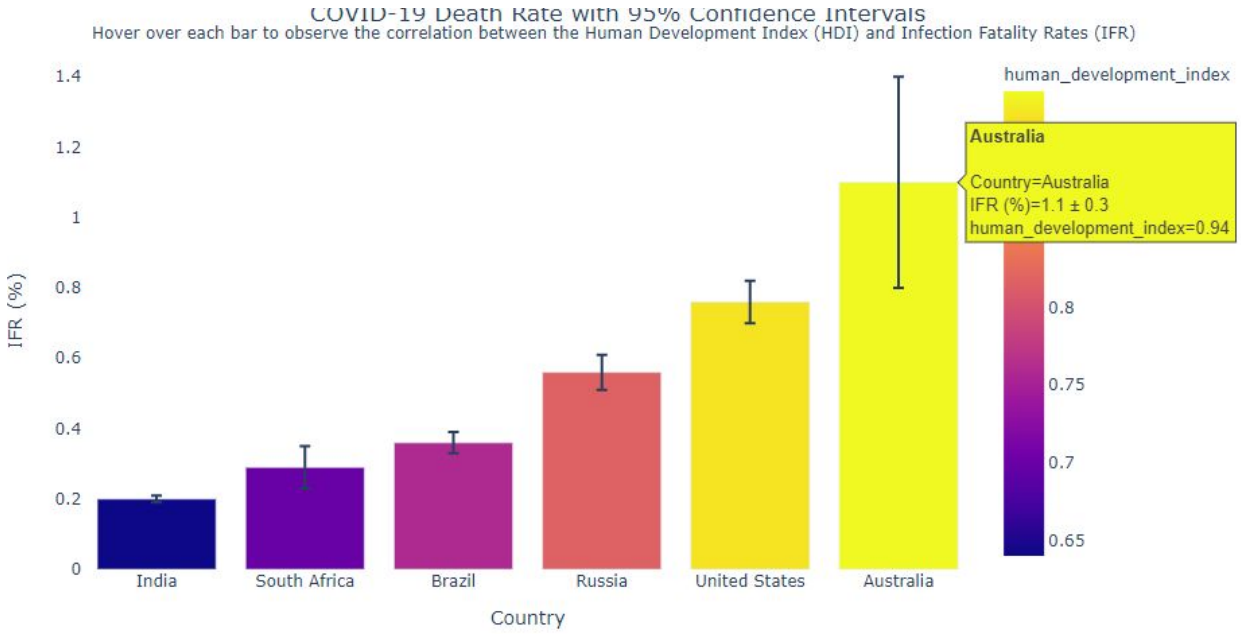
Date	Duration	Experimenter	Participant Description
14th Nov	4 minutes	Cynthia Mather	Student with Business Background

Visualisation	Observations	Changes made after think aloud
Bar plot	● "Very pretty" ● "Why is Australia so high? It seems that we are doing bad but I thought we did better than India? ● Don't understand sub headings, "too complicated, make it simple" ● "Say death rate rather than infection fatality rate"	● Simplify title
Scatter plot	● "Very pretty" ● "Give descriptions or more context like what's GDP?"	

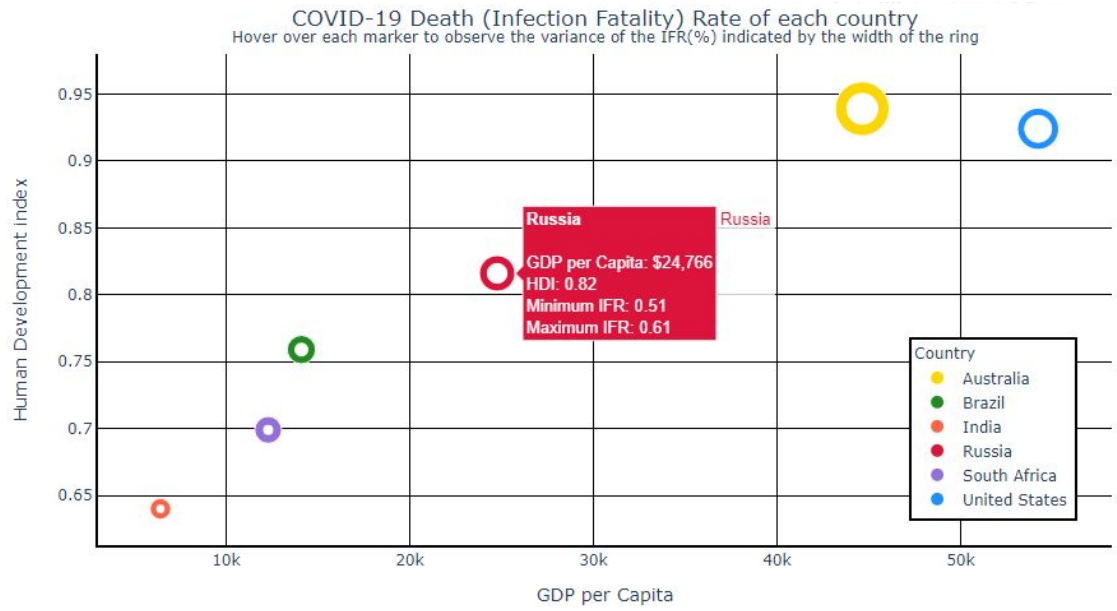
DISCUSSION

The think aloud was a success as there were lots of improvements made, these are the graphs after the think alouds:

Graph 1



Graph 2



All participants gave positive remarks and ideas of improvements and these were considered at each step. The first few think-aloud had remarks that could improve the visualisations such as gridding and subheadings. But towards the last few think-aloud, it was apparent that the lack of context was the pitfall for the graphs. For simplicity, we decided to leave the context and any further description of variables in the product notebooks. Small improvements were made after each think-aloud, to account for different mental models.