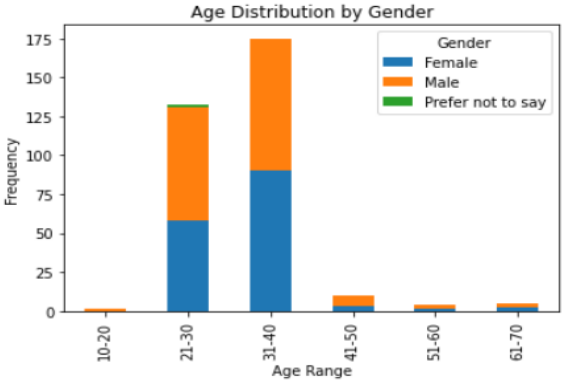
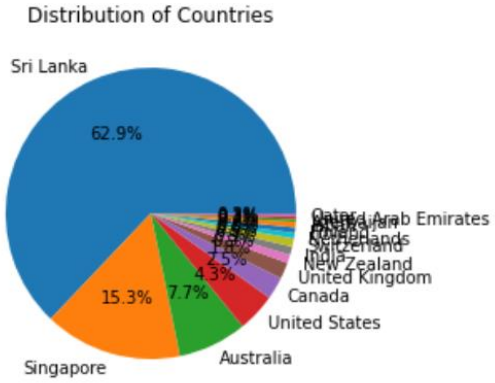
Explainable AI - Data Analysis | Group O | 210257F,210372D,210520G,210620M,210714F
(Group-O/ at main · Lason360/Group-O (github.com)**)**

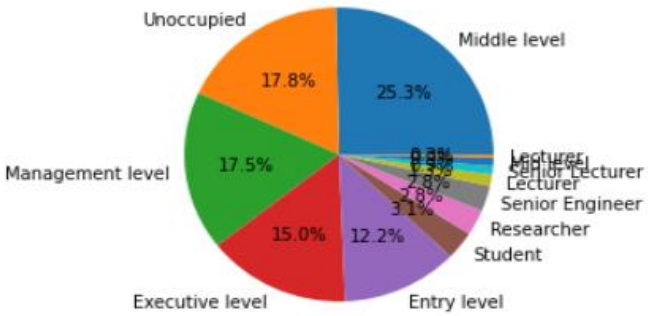
Descriptive Analysis





- According to the given sample dataset of the survey the above figure 01 shows the distribution considering the age and the gender.
- And the figure 02 shows the distribution of countries. Since the survey was taken from most of the Sri Lankans, the majority is Sri Lanka. So, this doesn't represent the world population well.

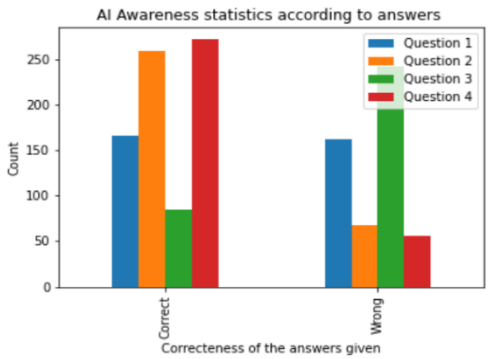
- The distribution of the occupation levels as follows.



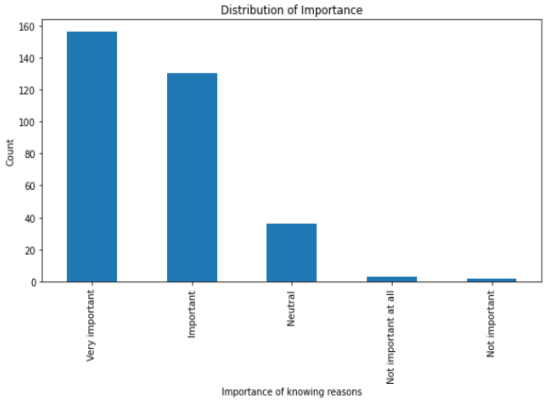
Insights

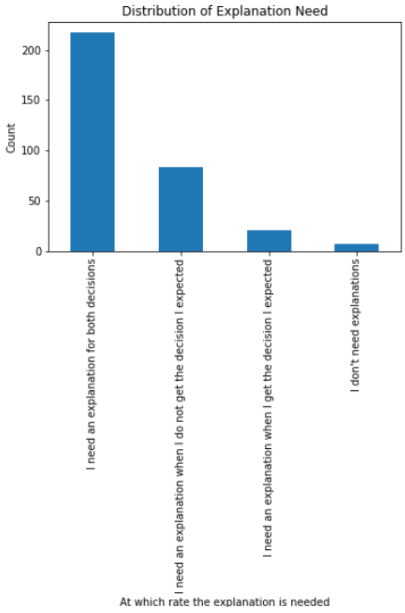
Insight 1:

- Most respondents to the study are aware of artificial intelligence (AI), as shown based on the answers provided in Section 2 for the questions 7,8,9 and 10.



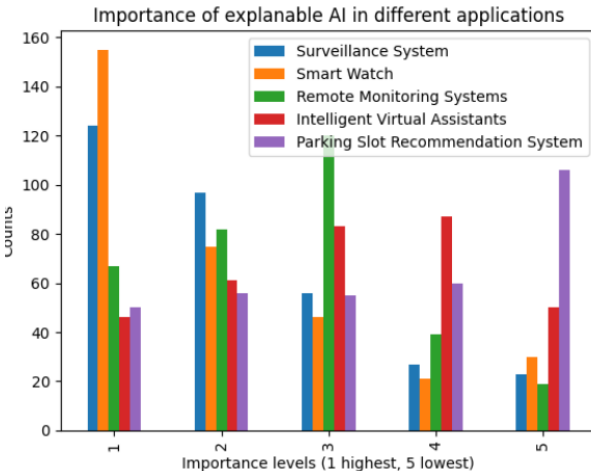
- The study results indicate that most people anticipate Explainable AI. It makes sense that some people wouldn't expect explainable AI because there are a lot of incorrect responses, and they could not be very knowledgeable of AI.





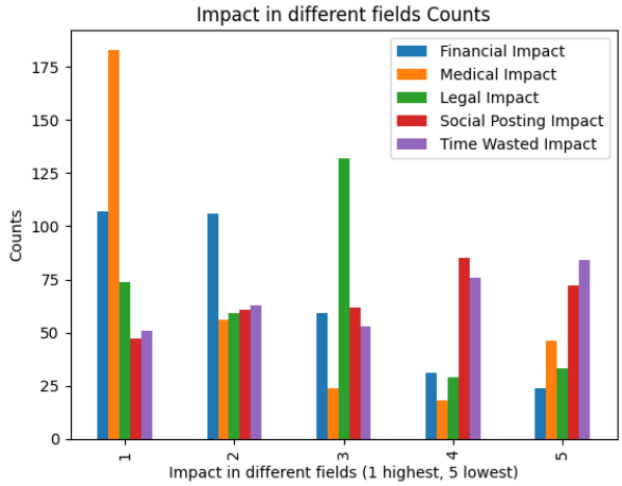
- According to the answers given for the questions 12 and 13 in section 3, for a significant number of participants, it's important to know more about and need explanations about AI.

Insight 2:



- According to the rating were marked for question 20, are the most desired applications. people need explanations about the specific applications while Smart Watch and Surveillance Systems being prioritized, giving an explanation of their expectations for AI transparency.

Insight 3:



- According to the rankings were given for the question 17, the most explanation needed impacts tend to be financial and medical while legal impact has a moderated rank. The reason behind that may be they've already been succeeded showing the results in those fields using AI.

Hypothesis Testing

When testing these hypotheses, the perceived importance of XAI was evaluated using the question, "Assume that an AI system makes decisions for you in your day-to-day activities. How important is it to know the reasons behind such decisions?" A separate attribute named "perceived_importance" was created by mapping the importance suggested by each individual on a scale of 1 to 5, with 5 indicating the most important. All the conclusions below were based on that extracted data.

H0: Gender significantly impacts the perceived importance of XAI.

Using Spearman's correlation coefficient on this yielded a coefficient value of 0.10522 and a p-value of 0.0601, at a significance level of 0.05. This information doesn't provide enough evidence to reject the null hypothesis. This conclusion was further supported by examining a scatter plot of the data.

H1: Age significantly impacts the perceived importance of XAI.

We conducted an ANOVA on this data and obtained an F-statistic of 2.379 and a p-value of 0.0743. With a significance level of 0.05 and this p-value, we don't have enough evidence to reject the null hypothesis. Since these values lie close to each other, there might be a weak or marginal effect.

H2: Education significantly impacts the perceived importance of XAI

Education level was mapped on a scale of 1 to 6. These values were used to obtain a chi-square statistic, resulting in a chi-square statistic of 16.31 and a p-value of 0.697. This p-value is higher than the significance level of 0.05, which suggests that there is insufficient evidence to reject the null hypothesis.

H3: Occupation significantly impacts the perceived importance of XAI

Conducting a chi-square test of independence yielded a p-value of 0.99, which is considerably higher than the significance level of 0.05. This suggests that there is strong evidence to suggest that we fail to reject the null hypothesis.

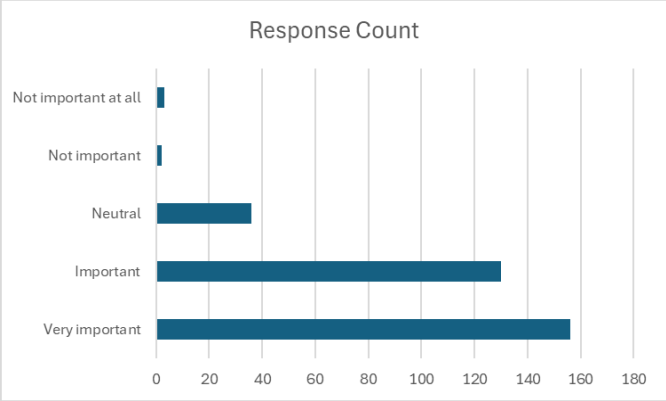
H4: Carer level significantly impacts the perceived importance of XAI.

Conducting a chi-square test of independence yielded a p-value of approximately 0.350, which is greater than the typical significance level of 0.05. Therefore, we do not have sufficient evidence to reject the null hypothesis.

H5: AI awareness significantly impacts the perceived importance of XAI.

Based on the questions asked in the AI awareness section, a scoring system was used to score each question, creating a new column with these scores, which were of a discrete data type. The Spearman's rank correlation coefficient obtained was 0.0412, with a p-value of 0.4621. Based on this information, we do not have sufficient evidence to reject the null hypothesis.

I. Is it important for users to know the reasons behind the decisions of AI systems?



Yes
Considering the graph of the responses which surveyed people's idea on importance of XAI it is clear that majority of people of the survey group consider XAI or knowing the reasons behind AI decision making is important for them.
Using =countif(range,criteria) function in excel and graphs

II. Which impact (financial, medical, legal, etc.) caused by AI decisions gives rise to XAI being of higher importance?

Impact Type	Average score (low score means more impactful)
Financial	2.26
Medical	2.05
Legal	2.66
Social posting	3.23
Time wasted	3.24

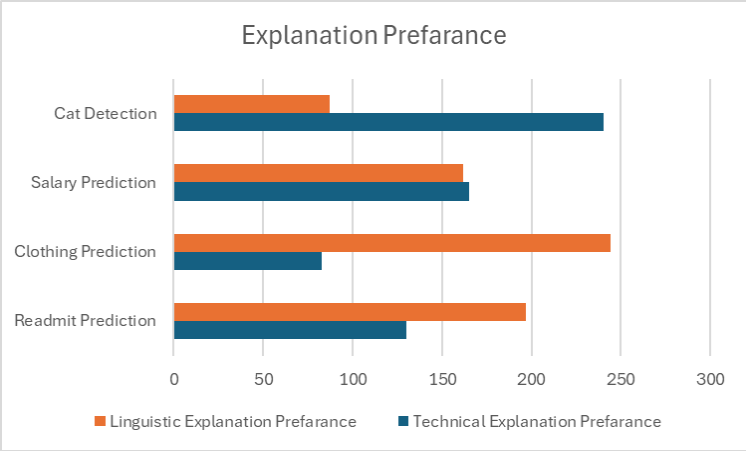
Medical impacts gives rise to XAI being of higher importance
Using =countif(range,criteria)

III. Which ELE application gives rise to XAI being of higher importance?

Application	Average score (low score means more impactful)
Surveillance System	2.17
Smartwatch detecting heart disorder	2.07
Tunnel maintenance alarm system	2.57
Virtual assistant helping with home appliances	3.10
Parking slot recommendation	3.35

Using =countif(range,criteria) formula in excel

Smart watch that detects Atrial Fibrillation in stroke survivors is considered as the highest important demand in XAI



IV. Are linguistic explanations preferred over other types of explanations?

Preference of the explanation type varies with the application. It is not clear whether linguistic or technical explanation preferred generally.

Using =countif(range,criteria) Formula in excel

V. RQ4: What are the expected characteristics of explanations?

People expect mainly **Easy, Faithful, Descriptive, Consistent, Discreminative** explanations according to the word cloud use in the question 21 answers.

Using WordCloud module in python