PROJECT REPORT

1.ABSTRACT :

The aim of the project is to Analyse user behaviour & optimise the user workflow using a machine learning algorithm.

Firstly I have created an e-commerce website using Html,css,javascript,bootstrap then deployed the site through Github webpages . It contains various webpages such as home, store, account, about, contact us. There are various features like product details, add to cart, search products and payment gateway. We have also used filters to change the product list (e.g. category, price range, etc.). I have applied user guiding tool named WalkMe that will guide a new user through orderly steps on my website to use it in the most simple way to buy a product. I have integrated my website to analytics platform named Google Analytics. This tool is able to track the users action and the time spent by the users on the various actions of the website. I have accumulated the analytics data from various users and stored it. I have collected data of around 75 users with various data points such as time spent by users on the different pages on website, filters being used by the users , time spent by users on particular product page, etc. Then, Fitting the Markov Chain model gives us the transition probabilities matrices and the lambda parameters of the chain for each one of the three lags along with the Start and End Probabilities

2.INTRODUCTION :

A website user is a person who is accessing, browsing or interacting with a website, and user behavior refers to how people use a website. Behaviors include everything from the journey they take through the site to interactions such as clicks. When it comes to optimising a website, simply monitoring behavior can only get you so far. The real value comes from analysing users' actions to get to the bottom of what makes them behave as they do. Behaviour is complex and varies across different websites depending on the target audience. This means you need to learn specifically about your users. Who are they? What are their needs? Which browsers and devices do they prefer? How often do they purchase? Answering these questions is crucial if you want to have a competitive edge, meet consumer needs and retain your customers. By researching online behaviours, you can get an idea of what users are trying to achieve, the factors driving certain behaviours, where they experience friction and areas where user experience can be better. Ultimately, learning how visitors behave on your website allows you to provide an enhanced experience that's in line with user needs, which in turn will ensure your business continues to grow. One of the main tools we use to carry out research is Google Analytics. This is free and fairly easy to set up. Once installed, you'll have access to valuable data about how users behave on your site, including where they land and go next, where they drop off and what they interact with. You can also use it to discover overall trends and patterns and source opportunities for growth..

3.WEBSITE :

E-commerce websites are online portals that facilitate online transactions of goods and services through means of the transfer of information and funds over the Internet. In the early days, e-Commerce was done partially through emails and phone calls. Now, with a single website, anything and everything that a transaction needs, can be executed online.
I have used following steps to create my E-commerce website:
I have used Github webpages for Web hosting.
my website link(https://ganesh-yadav.github.io/Analyse-User-Behaviour-Optimise-the-User-Workflow-Using-a-Machine-Learning-Algorithm/)
My website contains following webpages:

a) Home- It is the homepage of my website.

b) Store- It contains various products categorized into different categories.

c) Account- It contains account details of the user.

d) Contact Us- It contains the contact details of the company.

e) About- It contains team details.

Website contains various features:

a) View a list of products

b) View product details

c) Search products

d) Use filters to change the product list (eg. Category, price range, etc.)

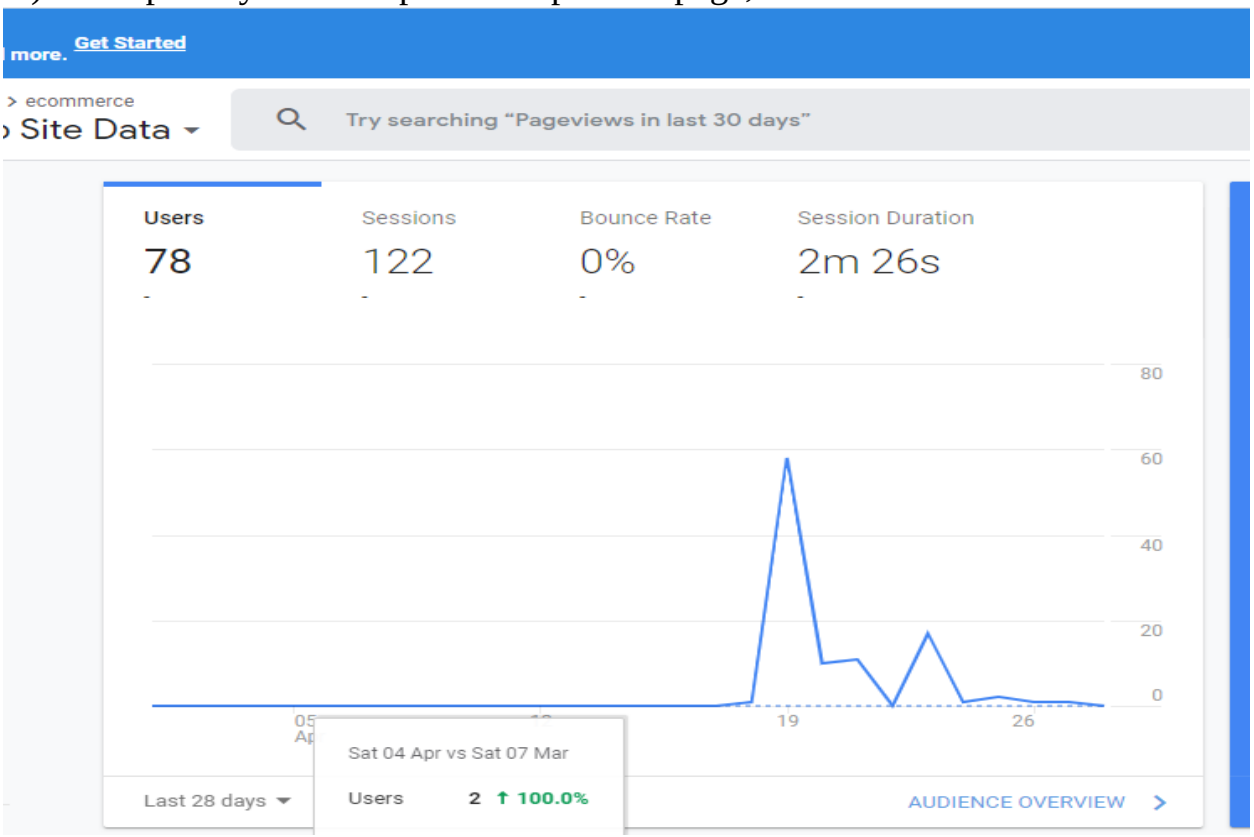
e) Add a product to the cart.

User Guide (walkme) - I have applied user guiding tool named WalkMe that will guide a new user through orderly steps on my website to use it in the most simple way to buy a product.

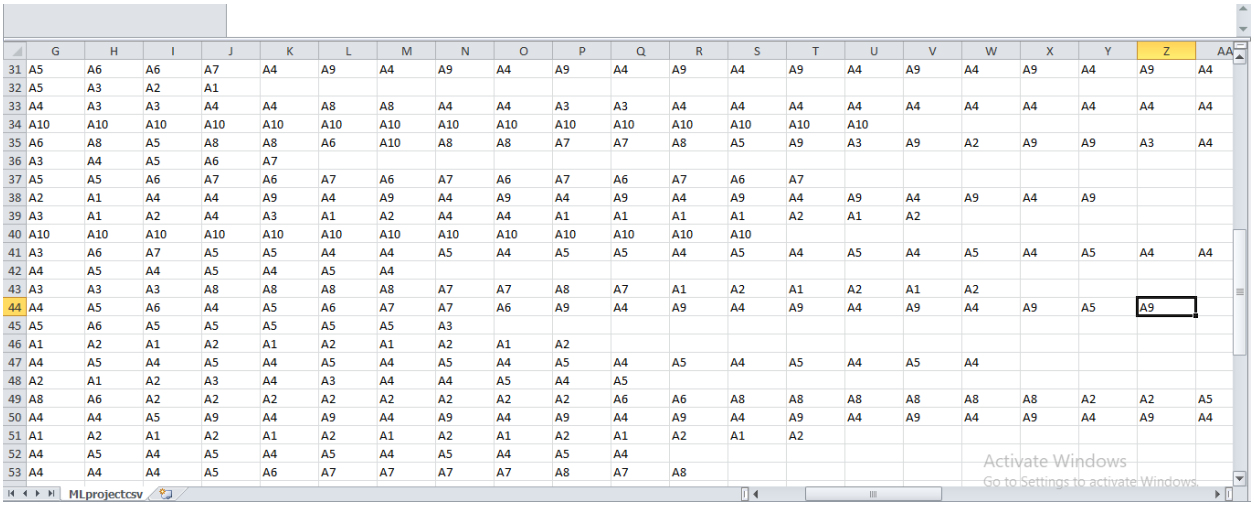
4.Data Analytics :

I have integrated my website to analytics platform named Google Analytics. This tool is able to track the users action and the time spent by the users on the various

actions of the website. I have accumulated the analytics data from various users and stored it.
I have collected data of around 80 users with various data points such as:
1) Time spent by users on the different pages on website,
2) Filters being used by the users ,
3)Time spent by users on particular product page, etc.



AUDIENCE OVERVIEW



ACTION PERFORMED BY USERS.

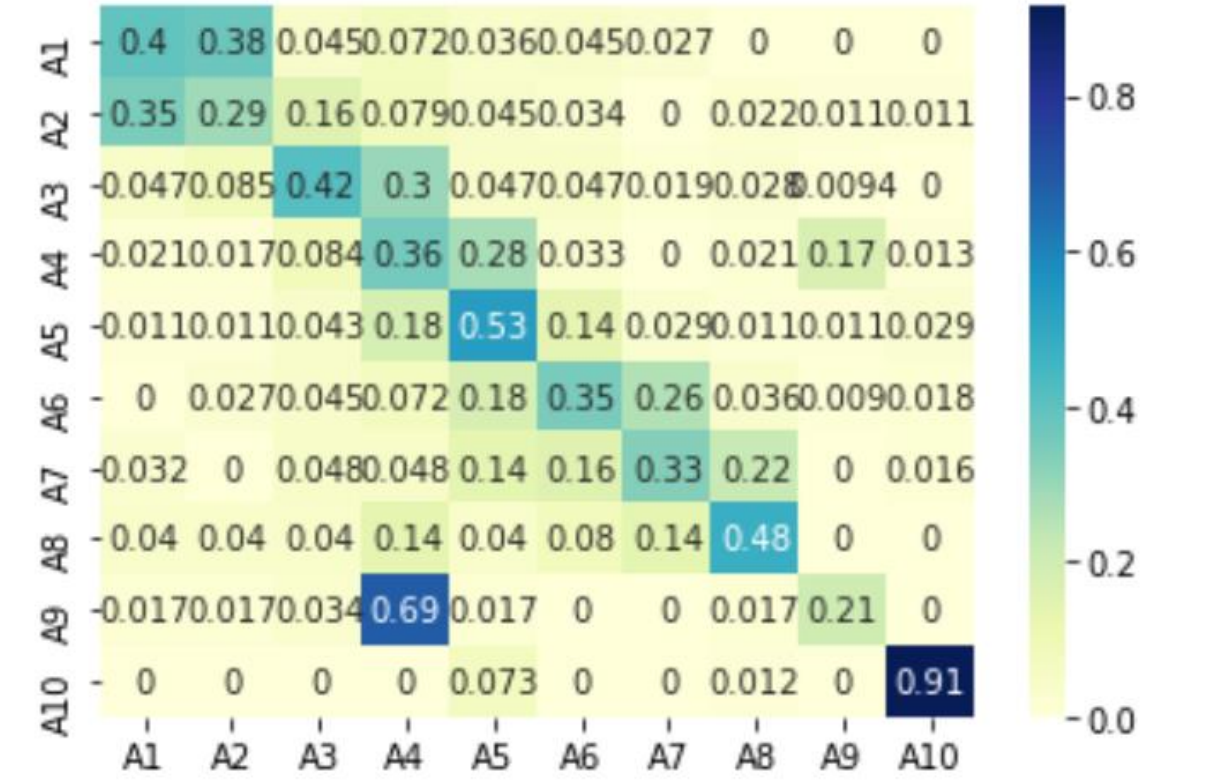
5.ML MODEL AND DATA ANALYSIS:

Markov Chains

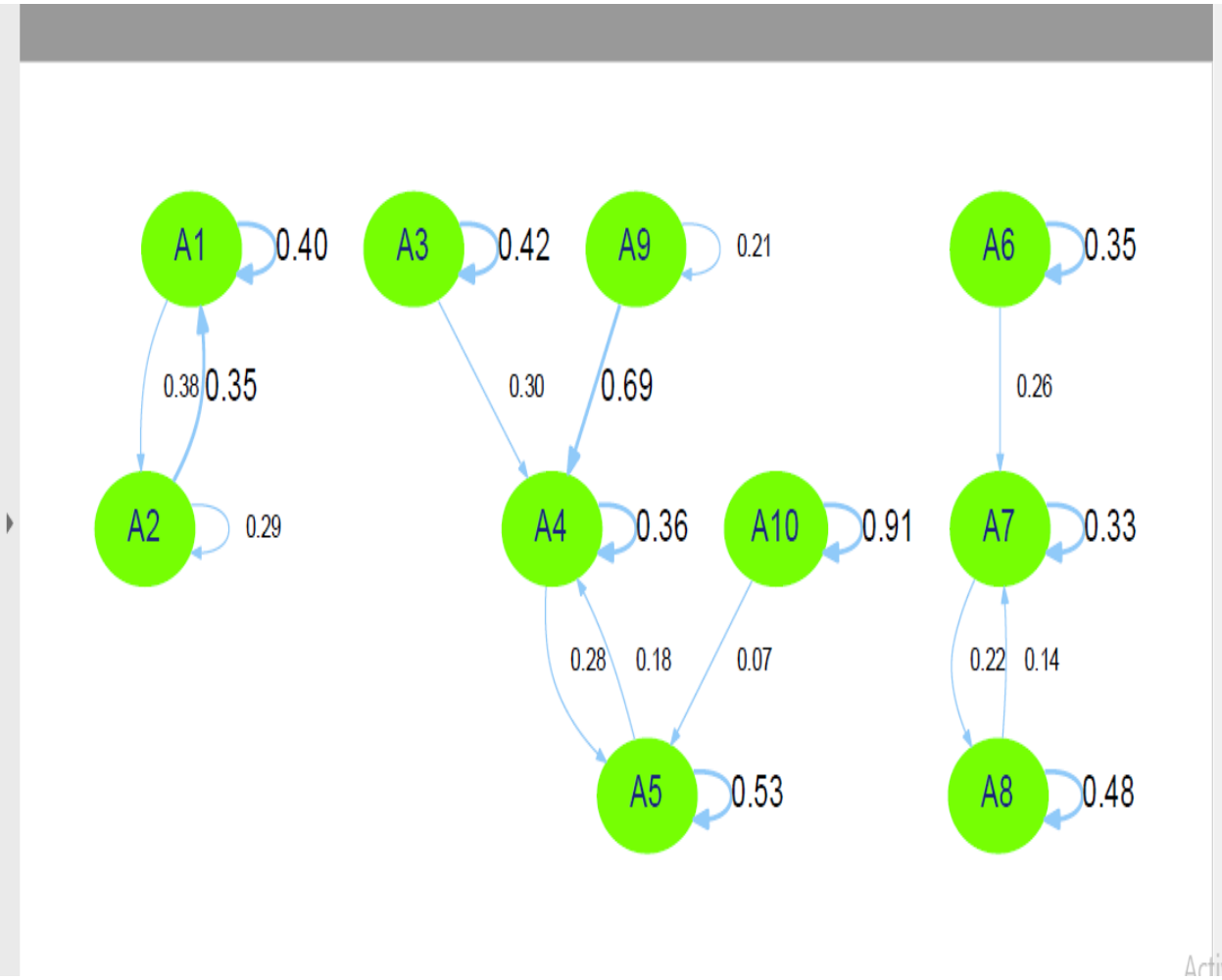
The type of data Markov Chains work with are sequential data.
Markov process is a stochastic process that satisfies the Markov Property of memorylessness. A Markov chain is, in fact, a Markov process too in either discrete or continuous time with a countable state space.
In clickstream analysis, we usually utilize these Markov Chains. The process takes the state from a finite set at each time . The order of a Markov Chain is derived from the number of recent states on which the current state, we assume, depends. Based on this, zero-order chains imply that the probability of being in a state in the next step is independent of all previous states.
Higher order Markov Chain introduced by the Raftery (1985) will lead to more realistic models. At the same time, the parameters needed for the representation increase exponentially and so it is important to find a right balance between these two.

FITTING MODEL THE ABOVE DATASET:

Fitting the Markov Chain model gives us the transition probabilities matrices and the lambda parameters of the chain for each one of the three lags along with the Start and End Probabilities.
Start and End probabilities correspond to the probability that a clickstream will start or end with this specific event.
The transition probability matrix can be represented as a heat map with the y-axis representing the current state and x-axis the next one. The more blu-ish the color, the more probable the indicated transition will occur.


A1 0.4 0.38 0.045 0.072 0.036 0.045 0.027 0 0 0
A2 0.35 0.29 0.16 0.079 0.045 0.034 0 0.022 0.011 0.011
A3 0.047 0.085 0.42 0.3 0.047 0.047 0.019 0.028 0.0094 0
A4 0.021 0.017 0.084 0.36 0.28 0.033 0 0.021 0.17 0.013
A5 0.011 0.011 0.043 0.18 0.53 0.14 0.029 0.011 0.011 0.029
A6 0 0.027 0.045 0.072 0.18 0.35 0.26 0.036 0.009 0.018
A7 0.032 0 0.048 0.048 0.14 0.16 0.33 0.22 0 0.016
A8 0.04 0.04 0.04 0.14 0.04 0.08 0.14 0.48 0 0
A9 0.017 0.017 0.034 0.69 0.017 0 0 0.017 0.21 0
A10 0 0 0 0 0.073 0 0 0.012 0 0.91
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
0.8
0.6
0.4
0.2
0.0

HEAT MAP



TRANSACTION DIAGRAM

ACTION DETAILS:

/homepage	A1
/shop.html	A2
/checkout.html	A3
/cart.html	A4
/blog.html	A5
/index.html	A6
/contact-us.html	A7
/login.html	A8
/product-details.html	A9
/404.html	A10
/payment.html	A11

Suggestion to UX Designer

The following are the insights from the Heat Map generated by the Markov chain model:
1. The transaction from Action 9 to Action 4, Action 1 to Action 2 , and Action 10 to Action 10 is more co-related to each other.

2. Action 1 to Action 3, and Action 5 to Action 6 is not co-related to each other.

Suggestion taken from transaction diagram along with the corresponding probability are:

3 All the users must start from A1 (homepage).

4. The user from action A8 (page product-details.html) are not going to A4 (cart.html). They should go to A4 (cart) so the UX designer should guide the user to go to the A4 from these actions.

5.The UX designer should guide the user to go to the A3 (Checkout) from A4 (cart) because only 30% are going to cart from checkout.

6. Users are either going back to A4(cart) or close the application at A 3(Checkout) without proceeding to payment (A11), so the UX designer should guide the user to place order and make payment.

7. The actions A5 (all are products(blog)) instead of going forward to cart (A4). Users are leaving the website. So the UX designer should guide the user to go to next actions to place order .
8. There are actions from A8 (login page) to A7(contact-us.html) . so users may find difficulty in logging to website.
9. users have 90% chances to go A10 (/404.html) from A10(/404.html) and leave the site .so the UX designer should check out why there is possibility of error pages.
10. there is 50% probability for users being in A5 (/blog.html) so UX designer should guide to product-details or to cart.
11.there is users going back from page A2(shop.html) to A1(homepage) .so UXdesigner need to guide users to cart and further to payment.