Data Visualization Project Report
Part 1 - 25/03/2024
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Project Description
The Dumbledilp's Equipment & Adventuring Distributions Inc. (alias D.E.A.D) prides itself as the premier e-commerce distributor of adventuring equipment worldwide. In an effort to revamp service delivery and marketing strategies, D.E.A.D. has meticulously documented all its sales over the past five years, including information on its customer base, products sold, regions serviced, and orders received. This project aims to leverage this wealth of data to uncover trends of sales/orders, analyse delivery times, identify successful and unsuccessful products, and gauge customer confidence in the company within the Forgotten Realms.

The main features investigated

- The *region*/*territory/area* nominal features spatially denote the territories where D.E.A.D operates, linking where customers are located and where orders originate. This is useful in gauging regional influence in customer confidence, trends in product demand and delivery time comparisons.
- The difference between *OrderDate* and *DeliveryDate* date features is used to denote delivery time and therefore evaluate its efficiency and influencing factors.
- The *Type* and *Subtype* nominal features categorise products in the first level and second level respectively while the *Products* and the *Product Name* features specifically identify the product sold/ordered. Together with the order *quantities* and *CartPriceInCP* numeric features, these features are used to evaluate the performance of the product, type or subtype and their influence on delivery times.

Research Questions

1. Is there a geographical influence on product demand (number of orders, value of orders, product diversity per order)?
2. What is the average delivery time per geographical area and how does it compare to other areas? Is the delivery time influenced by account type or order value?
3. Is there a change in product demand in the market over the 5 year period based on product, type and/or subtype?

Visual Design
Our approach to creating the final sketches to answer our research questions followed a path of broadly exploring various sketches specific to our research questions before narrowing down to the novel options using evolutionary design methods. During the initial diverge phase, we came up with many different sketches (also simple plots), each offering insights to answering our research questions. This phase, where we generated a lot of ideas, helped us to see the full range of possibilities and identify key points. During the emerge phase, we reviewed and analysed these sketches, and then grouped similar as well as general sketches. This guided us towards focusing on the most promising ideas. Through

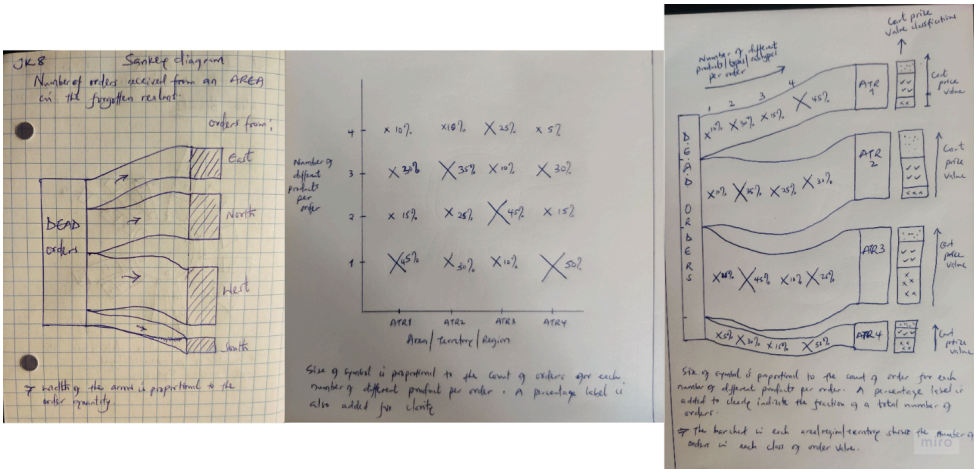
a process of reevaluating we combined similar ideas, reworked some sketches, and created a mixture of sketches best addressing the question we wanted to investigate. These final sketches were the result of collaborative thinking and improvement. By balancing exploration and selection, we were able to arrive at solutions that not only answered our questions but also helped to illustrate the data in the most effective and interpretable way.

Path From Diverge To Emerge and Converge

This path progresses from initial designs to a final outcome tailored to our needs. We started with basic plots, each addressing specific research questions. Individuals created and shared diverse sketches guided by these questions. After thorough comparison and analysis, we grouped sketches by their relevant research questions. Each member presented their sketches, emphasising key features. These designs were refined into a final sketch that effectively communicates findings and ensures user-friendly interpretation. We balanced complexity and simplicity, selecting elements that harmonise, resulting in a comprehensive new plot. Below, we outline the design encoding for each conceptual grouping.

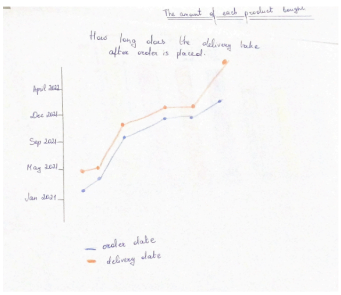
- **Geographical influence on product demand (number of orders, value of orders, product diversity per order)**

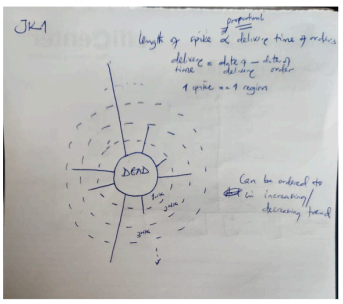
The first sketch shows the flow of products ordered from D.E.A.D to the customers in the different areas/territories/regions whereby the width of the strip is proportional to the region's order quantity. The second sketch goes a step further to highlight the share of different products, type or subtype in each order with labels indicating the fractional percentage. Sketch 1 is then reworked into sketch 3 to include the share of different products in each order (from sketch 2) and a bar chart added next to each strip to show the number of orders in each class of order value.

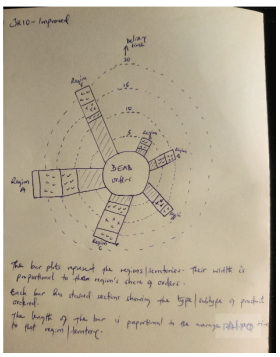


- **Delivery time per region and its influencing factors**

Sketch 1 shows the trend lines for order date and delivery date for each product. Sketch 2 shows the delivery time for each order represented by the length of the spikes. Sketch 3 shows the average delivery time per region with the length of the bars, the width of the bar depicts the share of total orders while bars are divided to show the share of product type or subtype ordered.

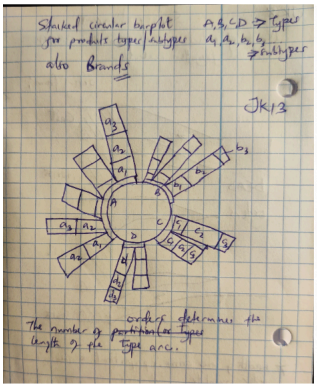


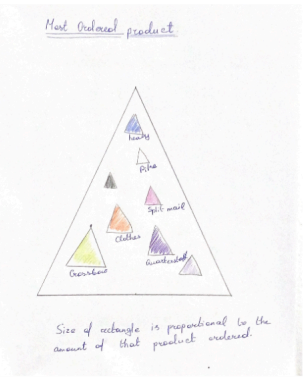




- **Change in product demand in the market over the 5 year period based on product, type and/or subtype?**

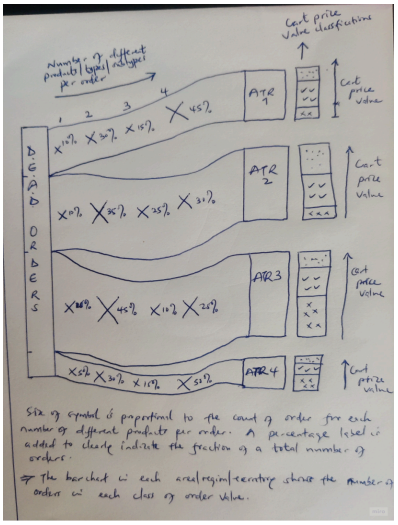
Sketch 1 shows the share of demand for a particular product type (length of arc) or subtype (barchart). In sketch 2, the size of the triangle is proportional to the quantity of product ordered with colour differentiating the different product types or subtypes. Sketch 3 shows the trend in demand for product, type or subtype over 5 years, where the circle size is proportional to the demand amount. Every year uses a unique colour to help identify the year.





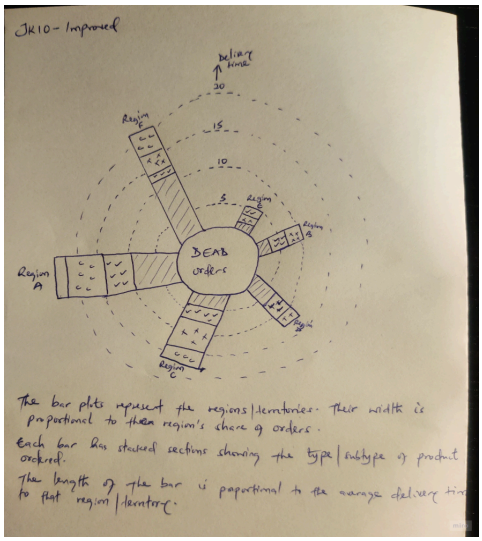
Reworked Sketches to answer research questions

1.



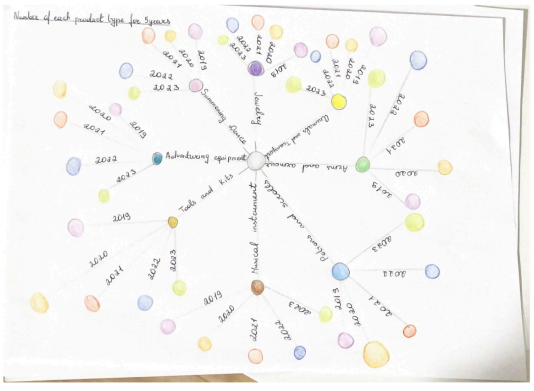
This sketch visualises the flow of products from D.E.A.D to customers quantified by the number of orders received from the different regions (areas) in the forgotten realm. It intends to highlight D.E.A.D's core business areas. The width of the strip denotes a region's share of the total number of orders received and serviced by D.E.A.D. The size of the symbols within the strips is proportional to the order count for a specification of diverse products, type or subtype. A label is added for clarity. The bar chart in each area/territory/region shows the order count in each class of order value.

2.



The sketch explores whether there are varied order delivery times across the regions/territories in the Forgotten Realm. The radial dotted lines represent the computed and categorised delivery time, for instance in days or weeks. Each region/territory is represented by a bar whose length is proportional to the average duration of order delivery. The bar width is varied to be proportional to the number of orders received from a particular region. Regions are labelled with region names while colour can also be used to differentiate them.

3. This sketch aims to demonstrate the trend of demand change for 5 years based on product type. In the middle we can see the **Product Type** as branch name, which evolves to 5 year branches for each plot. Every product type has a unique colour coded node helping to visually split the products. Each year has also a unique colour coding to allow capturing data for a specific year. This design allows comparisons for product demand between years and between product types.



Appendix A. Sketches overview