CSE-564: Visualization

Mini Project #2a Report

Saurabh Sanjay Agrawal (113278626)

Project Overview:

- This project focuses on the dimensionality reduction using PCA and visualization of CSV data in the form of Scree Plot, Scatterplot Matrix and PCA Biplot along with Elbow Plot and k-means clustering.

Data:

- The data used for this project is 'Udemy courses for Development' and it is obtained from following source in Kaggle: https://www.kaggle.com/jilkothari/udemy-courses-development

Attributes description:

Following are the attributes I chose from the dataset which I thought would be interesting to visualize and analyse:

- id: The course ID of that particular course.
- title: Shows the unique names of the courses available under the development category on Udemy.
- url: Gives the URL of the course.
- is_paid: Returns a boolean value displaying true if the course is paid and false if otherwise.
- num_subscribers: Shows the number of people who have subscribed that course.
- avg_rating: Shows the average rating of the course.
- avg_rating_recent: Reflects the recent changes in the average rating.
- num_reviews: Gives us an idea related to the number of ratings that a course has received.
- num_lectures: Shows the number of lectures the course offers.
- num_practice_tests: Gives an idea of the number of practice tests that a course offers.
- created: The time of creation of the course.
- published_time: Time of publishing the course.
- discount_price_amount: The discounted price which a certain course is being offered at.
- discount_price_currency: The currency corresponding to the discounted price which a certain course is being offered at.
- price_detail_amount: The original price of a particular course.

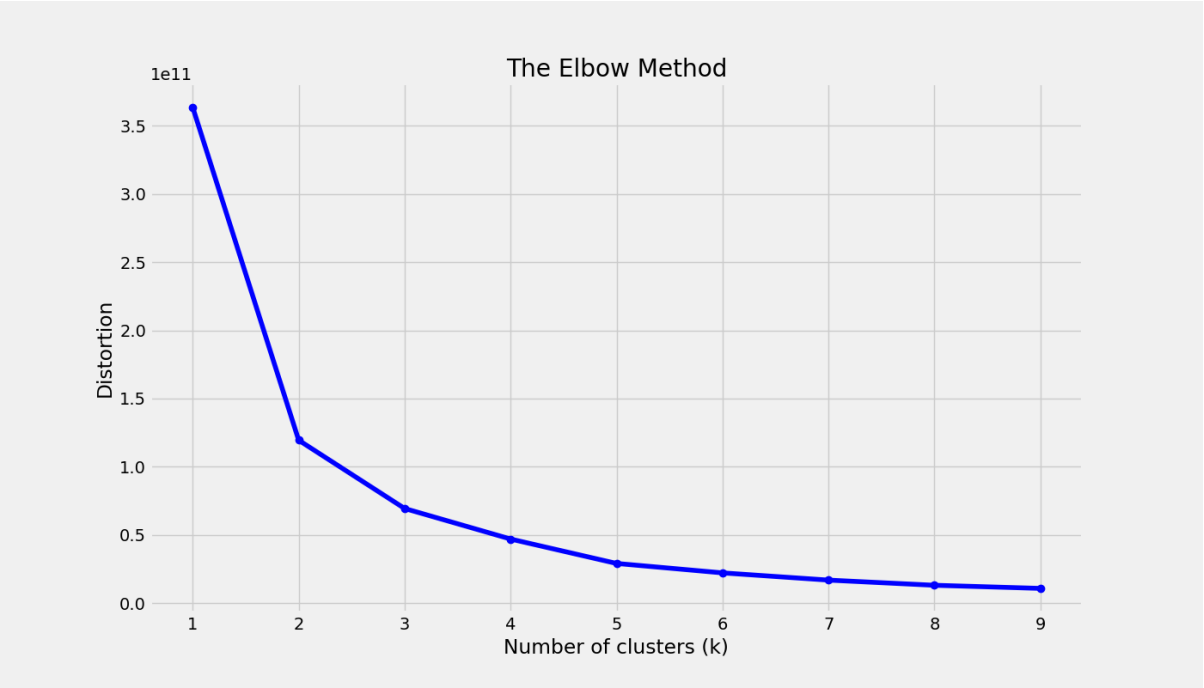
- price_detail_currency: The currency corresponding to the price detail amount for a course.

Reason for the choice of dataset:

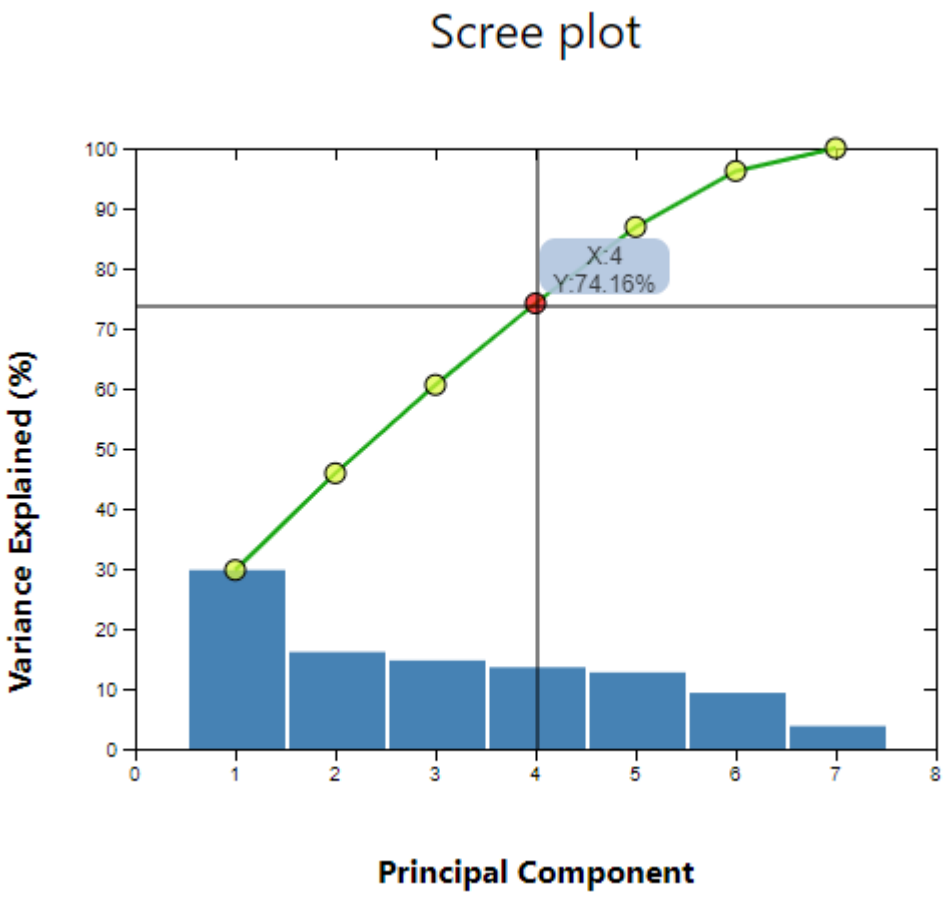
- This dataset contains a good amount of numerical features which can be of great use for dimensionality reduction using PCA.

Features implemented in this project:

1. Elbow plot
    - Helps in finding optimal k (number of clusters) in k-means clustering algorithm
    - There's an elbow at k = 2 in the below figure



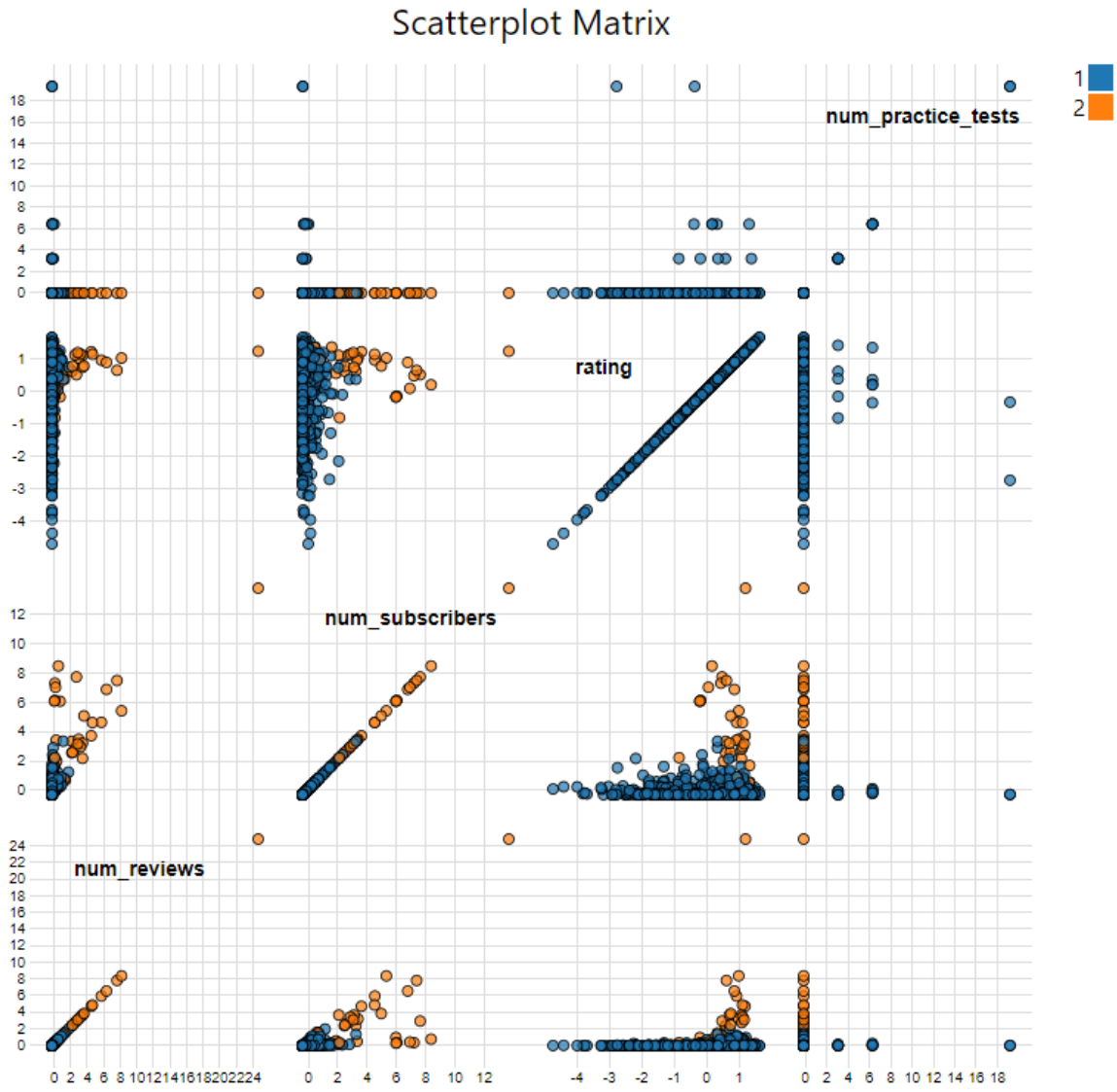
2. Scree Plot
    - Helps in displaying Principal Components as bars representing 'Variance Explained (%)' on Y-axis and Principal Components on X-axis.
    - User can select 'Intrinsic Dimensionality Index' by clicking on the circle on top of each bar, which is on the line plot showing cumulative 'Variance Explained (%)' for each Principal Component
    - This user interaction with the scree plot also makes updates in the Table showing Top 4 attributes and Scatterplot Matrix
    - On hovering on the circle, tooltip is displayed showing X and Y axis values
    - Crosshair is also implemented for good UX
    - On click of a circle, it turns red, so that user gets to know what 'Intrinsic Dimensionality Index' was selected



3. Table with top 4 attributes
    - This table shows top 4 Attributes based on the 'Intrinsic Dimeansionality Index' selected from the Scree Plot.

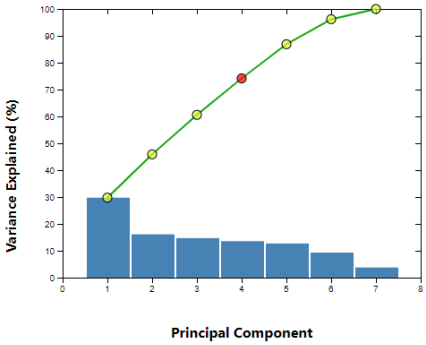
Top 4 Attributes (Intrinsic Dimensionality Index: 4)
num_practice_tests
rating
num_subscribers
num_reviews

4. Scatterplot Matrix
    - Helps in visualizing relationships between each combination of Top 4 Attributes in 2D in the form of Scatterplot for each combination
    - Legend on the right signifies the clusters



- All these three elements are kept on the same page for better analysis and UX

Scree plot



Top 4 Attributes (Intrinsic Dimensionality Index: 4)
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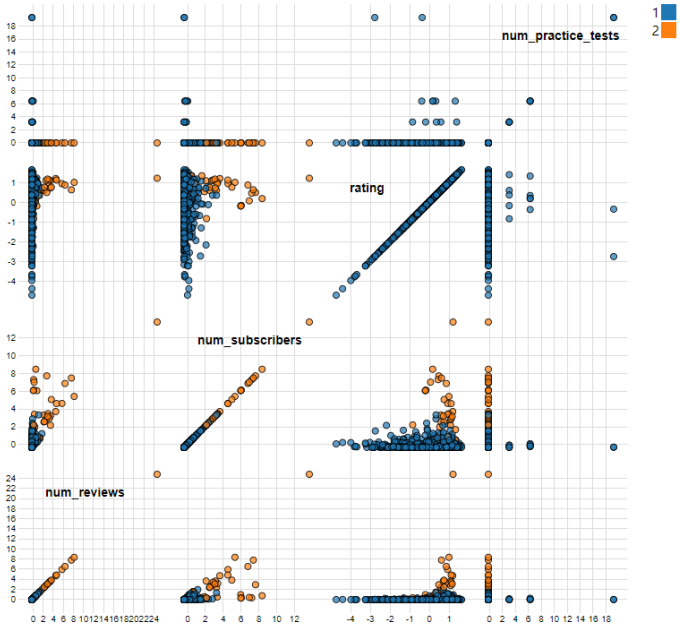
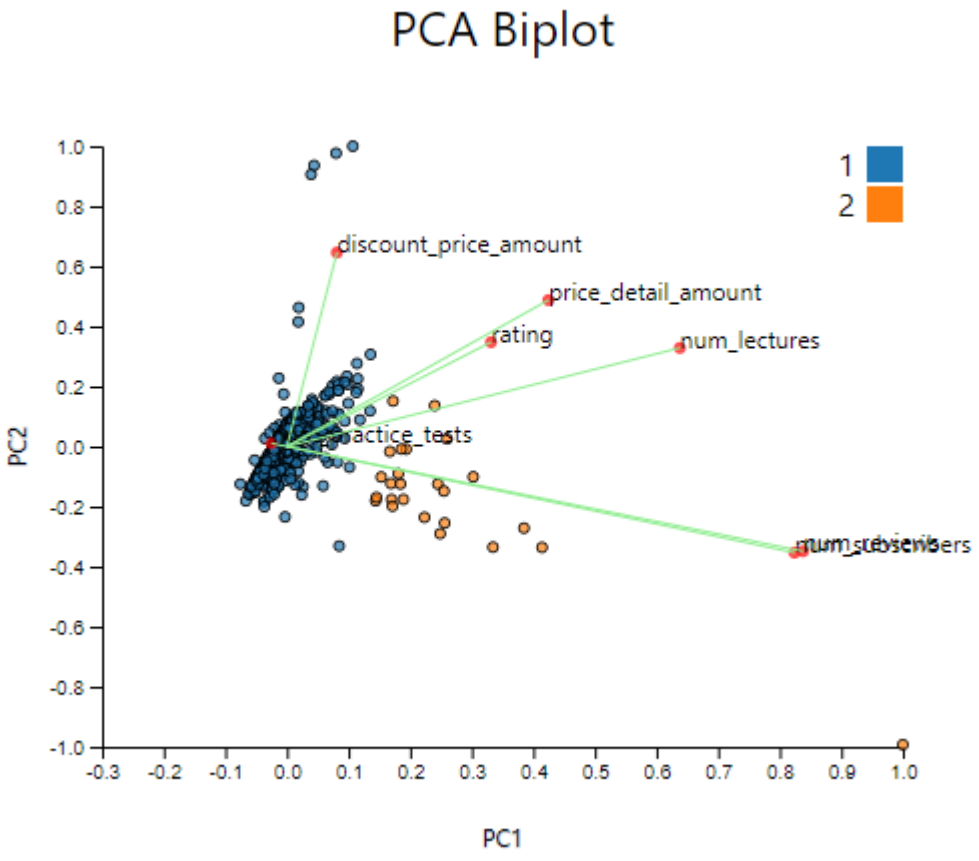
Scatterplot Matrix



5. PCA Biplot
   - Helps in visualizing information on both samples and variables of a data matrix for Top 2 Principal Components
   - Legend on the right signifies the clusters



Technologies used:

- Flask is used as a backend server for data pre-processing, sampling, performing dimensionality reduction using PCA, k-means clustering
- D3.js along with HTML and CSS is used for plotting all the charts on frontend.

Code Execution:

- Open the project in environment having python and type ‘python app.py’ on terminal
- Go to Chrome browser at ‘http://127.0.0.1:5000/’