CS661: Project Proposal Report

GROUP-10

1 Introduction

In today's world, social media plays a major role in the lives of students. While it helps in communication and entertainment, it can also lead to excessive usage and addiction. This addiction may affect a student's academic performance, mental health, and daily habits.

Our project aims to build an interactive web-based visual analytics system to analyze how social media addiction is related to students' academic life and well-being. We will use a survey-based dataset that contains various features such as time spent on social media, addiction scores, academic performance, and personal habits.

2 Data Source

We will use the "Students Social Media Addiction " dataset available on Kaggle:

(https://www.kaggle.com/datasets/pratyushpuri/students-social-media-addiction)

This dataset contains:

- Daily social media usage hours
- Social media addiction scores
- Academic performance (GPA or similar)
- Study hours, sleeping habits
- Demographic information (gender, age, etc.)

3 Specific Tasks

For this project, we will perform the following main tasks:

- **Data Aggregation:** Extract and compile student survey data into a structured format, ensuring compatibility for analysis.
- **Data Preprocessing:** Clean and process the dataset by handling missing values, removing inconsistencies, and transforming data for visualization.
- **Addiction Score Analysis:** Show distribution of social media addiction among students.
- **Academic Impact Study**: Analyze how addiction scores relate to academic performance.
- **Demographic Comparison:** Compare addiction levels based on gender and age group.
- **Daily Routine Impact**: Study how addiction affects sleep and study hours.
- **Cluster Analysis**: Group students into categories (low, medium, high addiction) and study their characteristics.

4 Visualization Tasks

We will implement the following key visual analytics tasks to extract meaningful insights from the dataset:

4.1 Addiction Score Distribution

Understanding how different groups of students experience addiction is important. This visualization will allow users to:

- Filter by gender, age group, or academic year to view patterns across segments.
- See the overall distribution of social media addiction scores across all participants.
- Identify which demographic groups have higher average addiction scores.

Suggested Visualization: Interactive bar charts or heatmaps showing average scores, with filtering options by demographic variables (gender, age, year of study).

4.2 Addiction vs Academic Performance

This visualization shows how social media addiction may be linked to a student's academic results. Users can:

- Explore the correlation between addiction scores and academic metrics like GPA or grade bands.
- Filter the results by gender, study habits, or year group.
- Identify if heavy usage correlates with low academic outcomes.

Suggested Visualization: Scatter plots with regression lines and optional confidence intervals, with filter options for demographics.

4.3 Demographic Comparison of Addiction

This task helps analyze addiction patterns across various demographic groups. Users will be able to:

- Select different genders or age groups and view their average addiction levels.
- Compare how social media habits differ between early and senior university years.
- Observe gender-based behavioral trends.

Suggested Visualization: Side-by-side box plots or grouped bar charts for different demographic categories, with interactive drop-down selectors.

4.4 Daily Habits Comparison

This task explores how addiction affects students' time management and daily routines. Users will be able to:

- Compare average sleep hours with addiction levels to examine if addiction leads to sleep reduction.
- Analyze how addiction levels affect time spent on studies.
- Identify conflicts between social media usage time and productive hours.

Suggested Visualization: Stacked bar charts, grouped histograms, or heatmaps.

4.5 Cluster Grouping of Students

This task groups students into similar behavioral categories using clustering techniques. Users will be able to:

- Visualize natural groupings of students based on addiction, GPA, and screen time.
- Study how each cluster behaves in terms of study habits and addiction levels.
- Observe demographic breakdowns within each cluster.

Suggested Visualization: Clustered scatter plots or dimensionality reduction plots (e.g., t-SNE).

4.6 Addiction and Device Usage

This task provides insights into how device preference may affect addiction levels. Users will be able to:

- Compare device usage (mobile, tablet, laptop) across student categories.
- Study the correlation between multi-device use and addiction severity.
- Identify if device preference is linked to reduced study time.

Suggested Visualization: Pie charts, grouped bar charts, or stacked bar plots.

4.7 Temporal Analysis of Usage

This task explores time-based trends in social media usage among students:

- Track the time of day when students are most active on social media.
- Compare patterns on weekdays vs weekends.
- Connect usage peaks to reduced academic engagement or sleep.

Suggested Visualization: Line graphs, area charts, or heatmaps segmented by time.

5 Overall Solution

We will build a **web-based dashboard** using Python libraries like **Plotly** and **Dash**. The system will allow users to interact with the data using filters (like gender, age, addiction level) and explore trends and patterns. Each plot will be interactive and connected to user-selected inputs. The goal is to help students, educators, and researchers understand how social media affects academic life.

6 Tech Stack

- **Backend:** Python (Flask/Django) and Pandas for data processing
- **Frontend:** Dash, D3.js/Plotly for interactive visualizations
- **Hosting:** Local or cloud-based deployment

7 Team Members & Responsibilities

Each member will contribute to different aspects of the project:

- **Data Processing & Cleaning :** Anmol Gupta (230156), Raj Aryan (230837)
- **Backend Development:** Arkajyoti Santra (230194), Raj Aryan (230837)
- **Visualization Development:** Raj Shekhar (242110609), Pankhuri Sachan(230734), Divya Mhetre(230649)
- **Frontend Development:** Priyanshu Mishra (230806), C Venkata Pranaya(230324)
- **Clustering & Analysis**: Pranav Bharti (240726) , Priyanshu Mishra(230806)

This project aims to leverage data analytics and interactive visualization to better understand the impact of social media addiction on student life. Our system will serve as an insightful tool for students, educators, and researchers to explore behavioral trends, academic correlations, and daily habits, ultimately encouraging healthier digital habits through data-driven awareness.