Unveiling The Virtual Classroom: An In-Depth Analysis of The Online Education System

IBM x SmartInternz

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Introduction

- Online learning platforms have proliferated during the COVID-19 pandemic and they have become the only source for teaching and learning.
- In regular classroom teaching, students' behavior and learning progress are monitored.
- But, in the case of online learning platforms, especially when there is a huge number of participants, require the help of artificial intelligence (AI), data analytics, etc. to monitor the learners' behavior and progress.

Objective

- The main objective is to offer key insights to educational institutions, policymakers, researchers, and online platforms by developing a comprehensive understanding of the online education ecosystem.

Business Requirements

- Research and data collection
- Active participation of stakeholders
- Technology infrastructure
- Expertise
- Data privacy
- Effective analytics
- Documentation
- Adaptability and scalability
- Extensibility

Literature Survey

State	Year	Work/Concept
H. P. VanDerSchaaf et al.	2023	▪ Discussed various factors that influence the student while adopting the technology.
F. Peruzzo et al.	2022	▪ Suggested that the examination of several education policy issues and complexities for the delivery of EdTech plays a key role.
F. Mohamed et al.	2022	▪ YouTube also has a significant impact on the learning process in terms of self-directed learning.
M. Hernandez-de-Menendez et al.	2021	▪ Information and communication technologies (ICT) have prompted a different learning style on the other side of the classroom.
J. R. Morrison et al.	2019	▪ The advancement of computer technology and education technology (EdTech) products showcased significant effects on school learning.
G. Alexandron et al.	2019	▪ The courses available in online learning platforms are referred to as massive open online courses (MOOCs). There is a dire need for proper learning analytics of MOOCs.
P.-H. Lin et al.	2018	▪ To better engage students and to connect with their instructors artificial intelligence provides good support.

Existing Problem

- There is a dire need to develop an intelligent virtual learning platform that engages students and analyses their learning behavior.

Proposed Solution

- A web-based and unified business intelligence application is to be developed and implemented to extract insights such as learning behavior, progress, etc. in online education platforms.

Hardware and Software Requirements

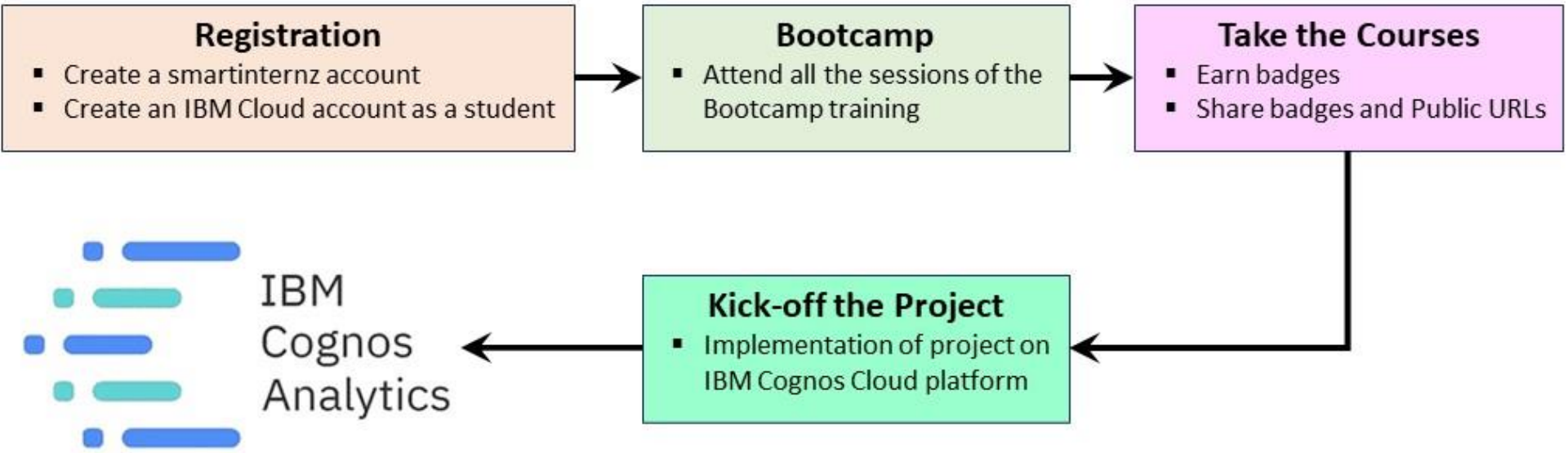
Hardware Requirements

- RAM: 4GB RAM minimum
- Processor: Intel i3 minimum
- Hard disk storage: 50GB minimum
- Networking: High-speed Internet Access

Software Requirements

- IBM Cognos Analytics
- Web Page Templates
- Python (latest version)
- Visual Studio Code
- Zotero

Block Diagram



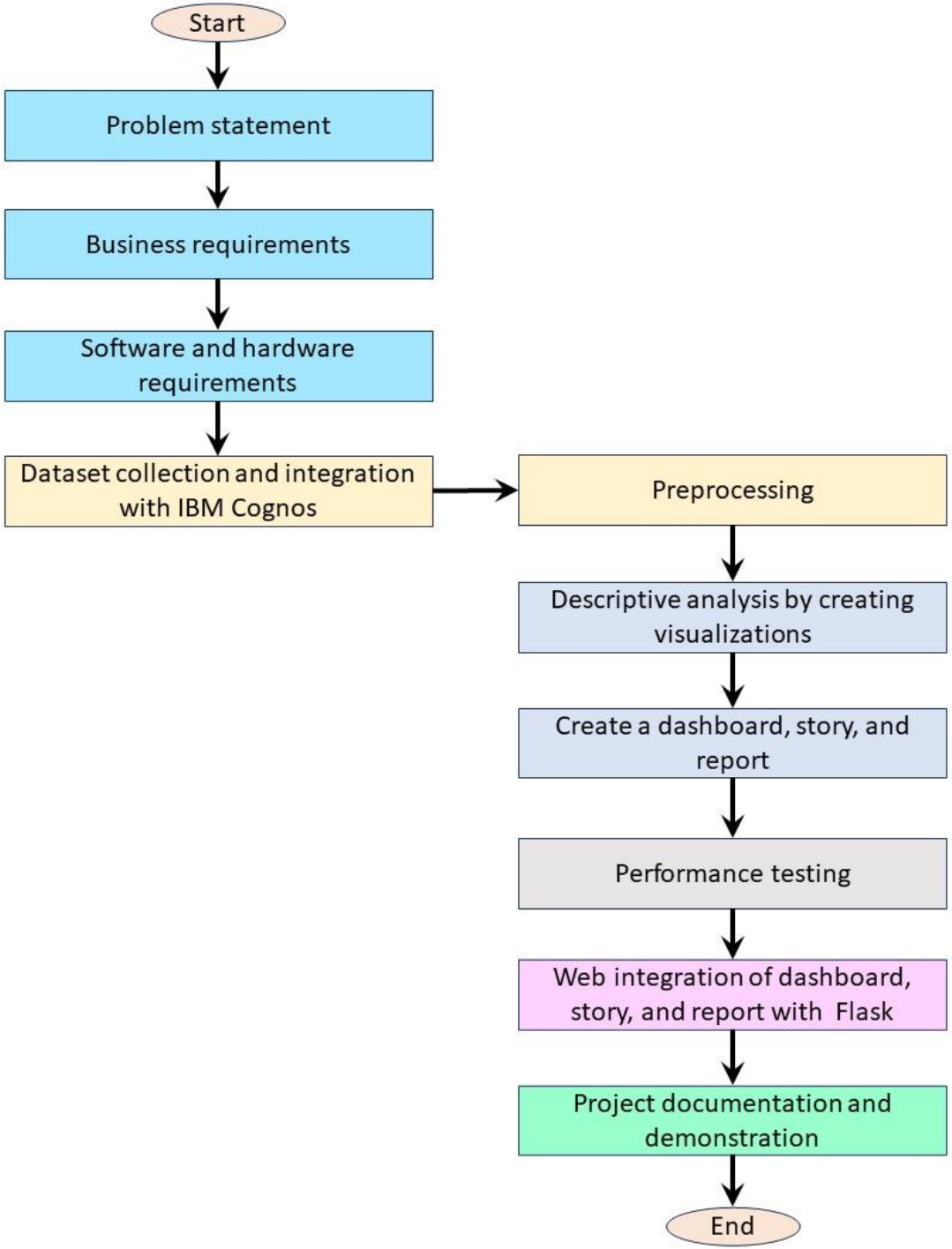
Dataset Description

Dataset Used: ONLINE EDUCATION SYSTEM REVIEW.csv

This dataset consists of 23 columns and 1033 records.

Columns	Columns	Columns	Columns
Gender	Economic status	Sleep time (hours)	Your interaction in online mode
Home Location	Internet facility in your locality	Time spent on social media(hours)	Clearing doubts with faculties online?
Level of Education	Are you involved on any sports	Interested in gaming?	Interested in?
Age	Family Size	Have a separate room for studying?	Performance in online
Number of subjects	Do elderly people monitor you?	Engaged in group studies?	Your level of satisfaction in online education
Device Type Used	Study Time(hours)	Average marks scored before pandemic in traditional classroom	

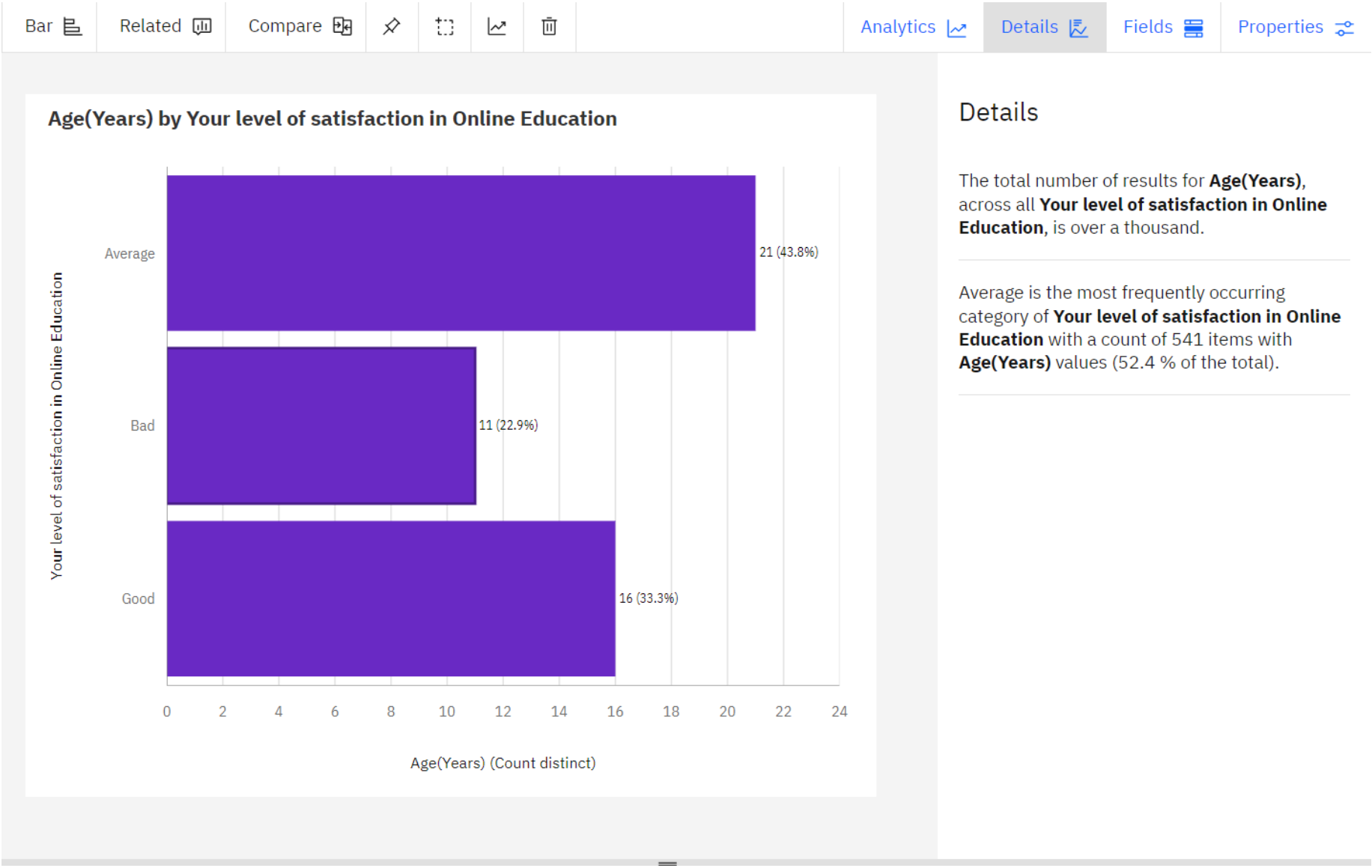
Flowchart


Start
Problem statement
Business requirements
Software and hardware requirements
Dataset collection and integration with IBM Cognos
Preprocessing
Descriptive analysis by creating visualizations
Create a dashboard, story, and report
Performance testing
Web integration of dashboard, story, and report with Flask
Project documentation and demonstration
End

Experimental Investigations

Name	Description
Age(Years) by Your level of satisfaction in Online Education	▪ The total number of results for Age(Years), across all Your level of satisfaction in Online Education, is over a thousand. ▪ **Internet facility in your locality is unusually high when Your level of satisfaction in Online Education is Average**.
Internet facility in your locality by Your level of satisfaction in Online Education	▪ Across all values of Your level of satisfaction in Online Education, the sum of Internet facility in your locality is over 3500.
Performance in online by Level of Education	▪ Over all values of Level of Education, the sum of Performance in online is nearly seven thousand. ▪ **Performance in online is unusually high when Level of Education is Under Graduate.**
Time spent on social media (Hours) by Device type used to attend classes	▪ Across all device type used to attend classes, the sum of Time spent on social media (Hours) is over 2500. ▪ **Time spent on social media (Hours) is unusually high when Device type used to attend classes is Laptop.**
Performance in online by Study time (Hours)	▪ Over all values of Study time (Hours), the sum of Performance in online is nearly seven thousand. ▪ **Performance in online is unusually high when Study time (Hours) is 4.**

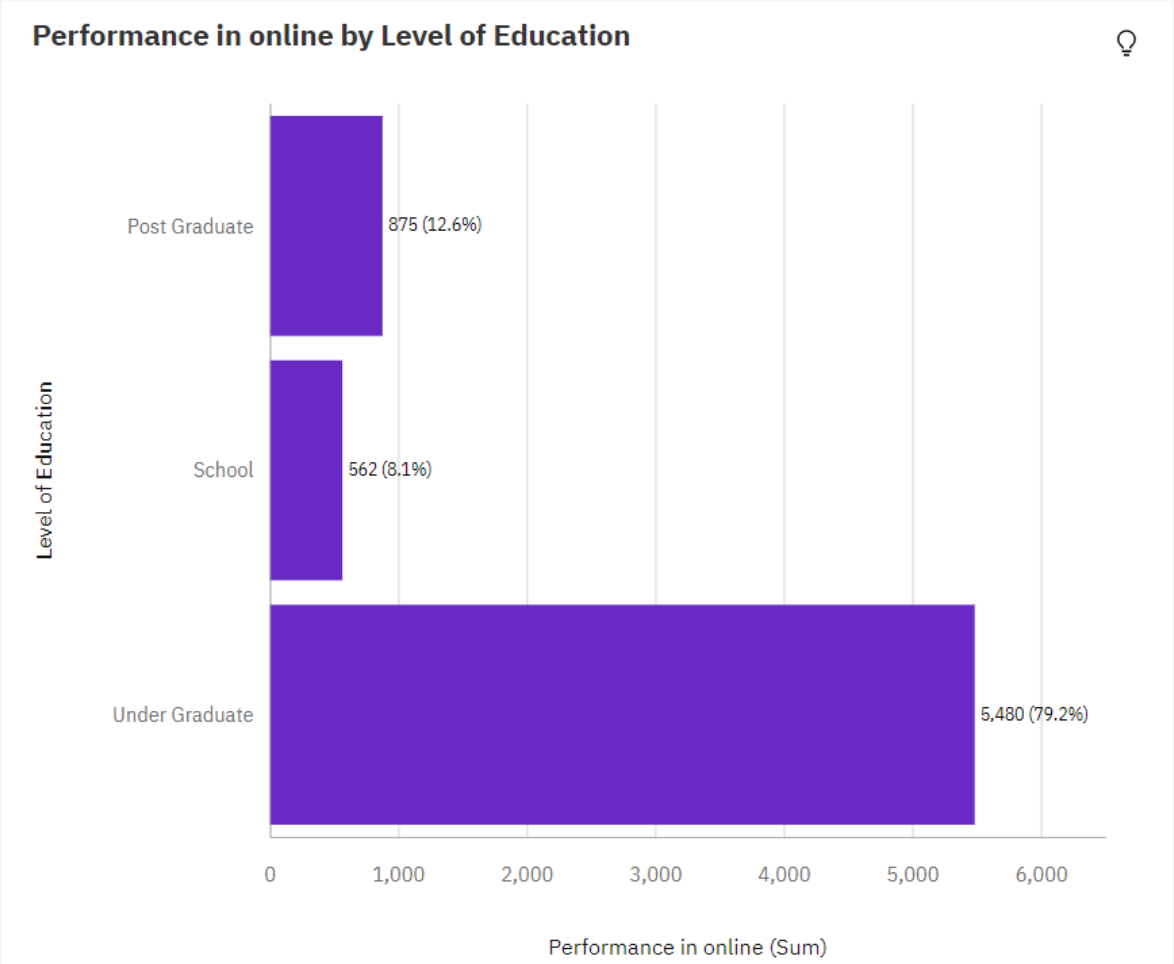
Result – Column Chart



Result – Bar Chart

Result – Bar Chart

Bar | Related | Compare | Analytics | Details | Fields | Properties



Details

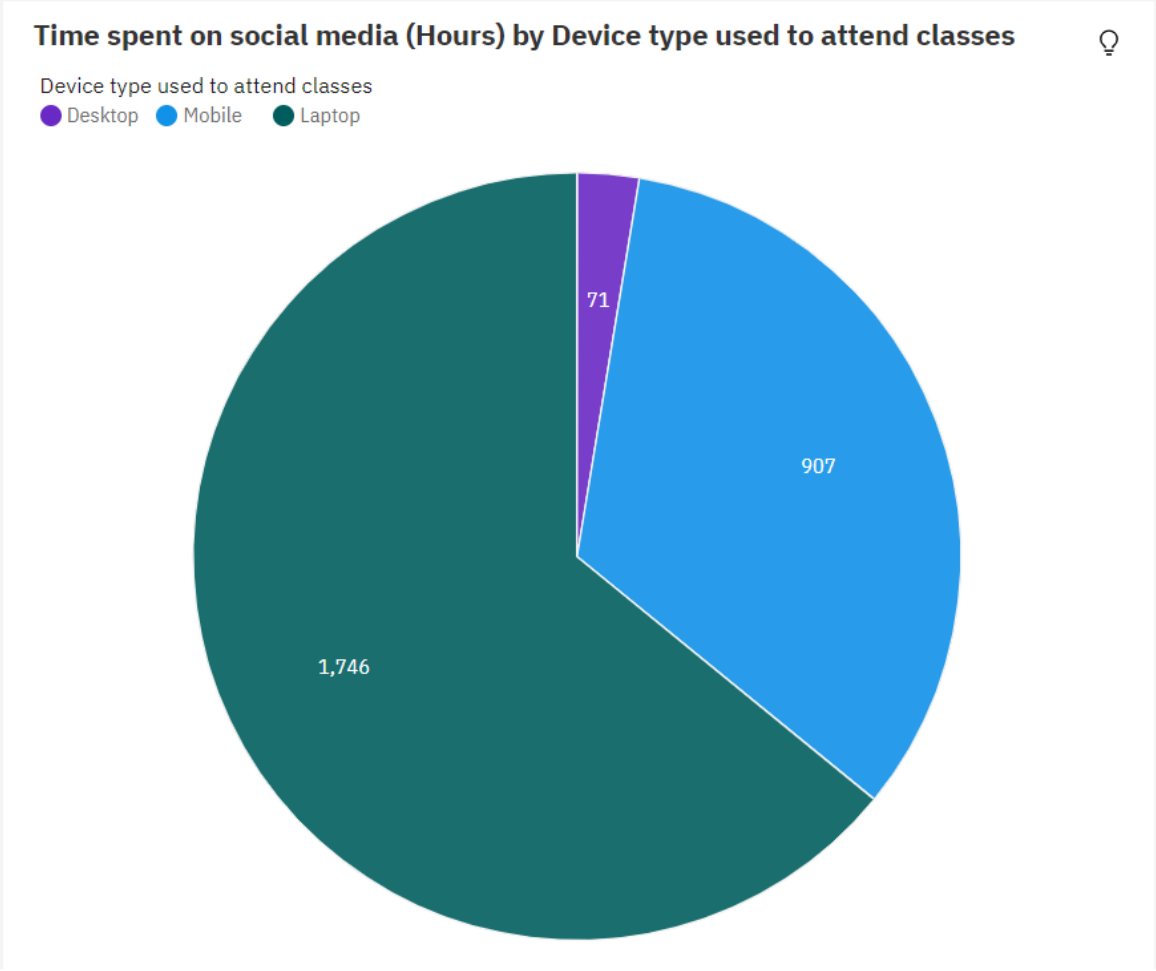
Over all values of **Level of Education**, the sum of **Performance in online** is nearly seven thousand.

Performance in online ranges from 562, when **Level of Education** is School, to nearly 5500, when **Level of Education** is Under Graduate.

Performance in online is unusually high when **Level of Education** is Under Graduate.

Result – Pie Chart

Pie | Related | Compare | Analytics | Details | Fields | Properties



Details

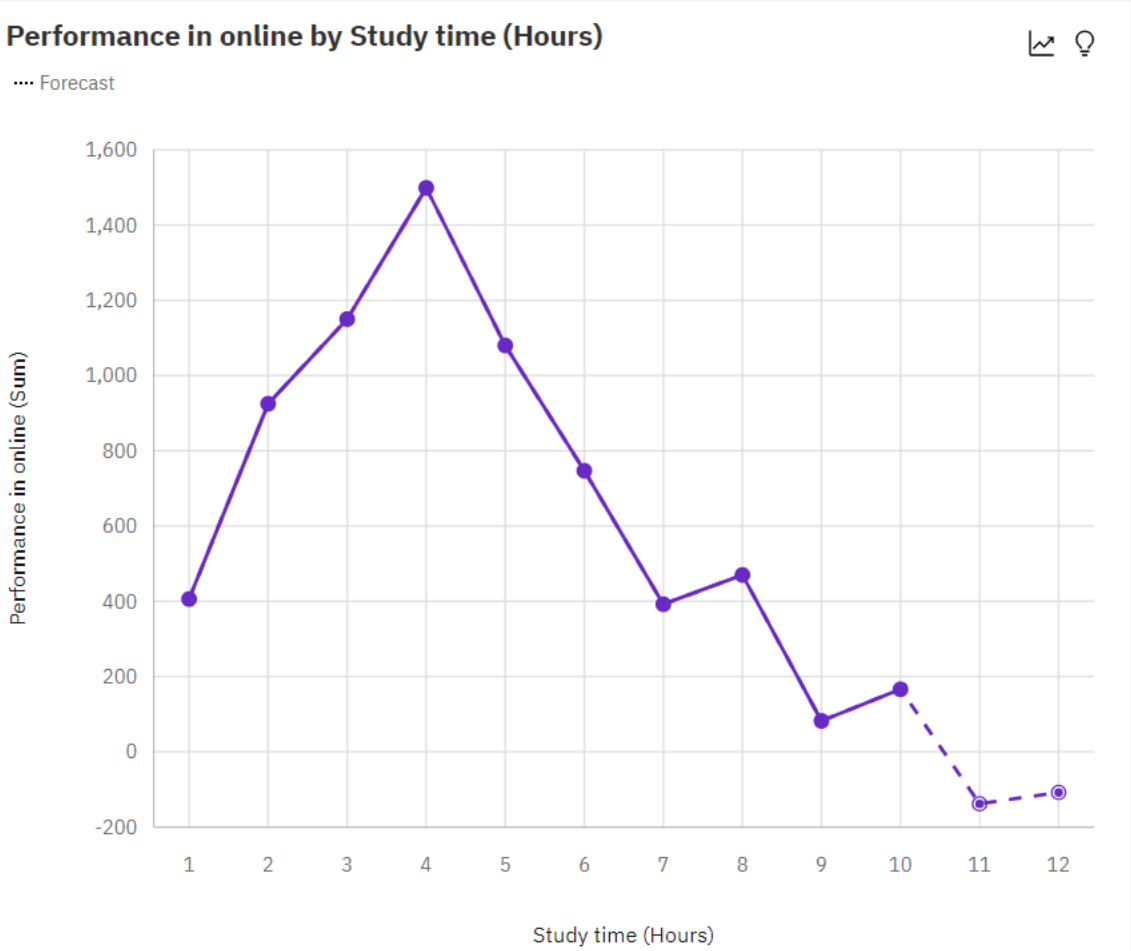
Across all **device type used to attend classes**, the sum of **Time spent on social media (Hours)** is over 2500.

Time spent on social media (Hours) ranges from 71, when **Device type used to attend classes** is Desktop, to over 1500, when **Device type used to attend classes** is Laptop.

Time spent on social media (Hours) is unusually high when **Device type used to attend classes** is Laptop.

Result – Line Chart

Line | Related | Compare | Analytics | Details | Fields | Properties



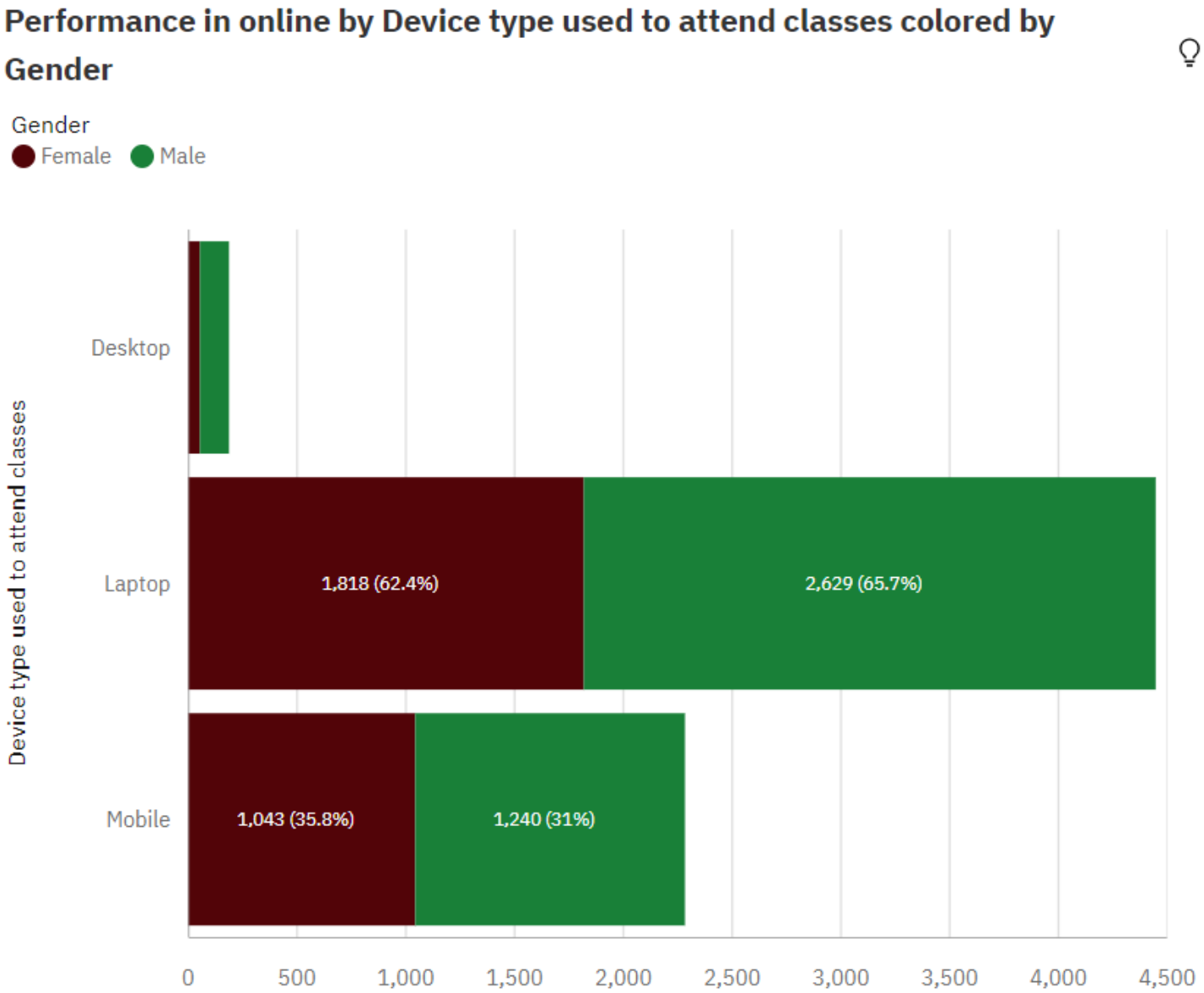
Details

Over all values of **Study time (Hours)**, the sum of **Performance in online** is nearly seven thousand.

Performance in online ranges from 82, when **Study time (Hours)** is 9, to almost 1500, when **Study time (Hours)** is 4.

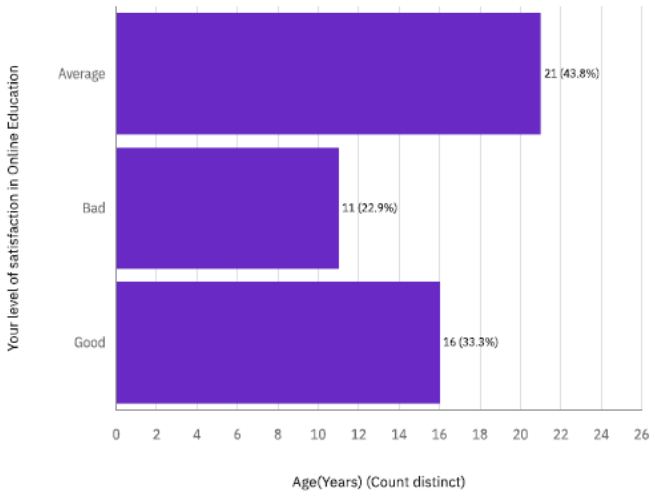
Performance in online is unusually high when **Study time (Hours)** is 4.

Result – Stacked Bar Chart

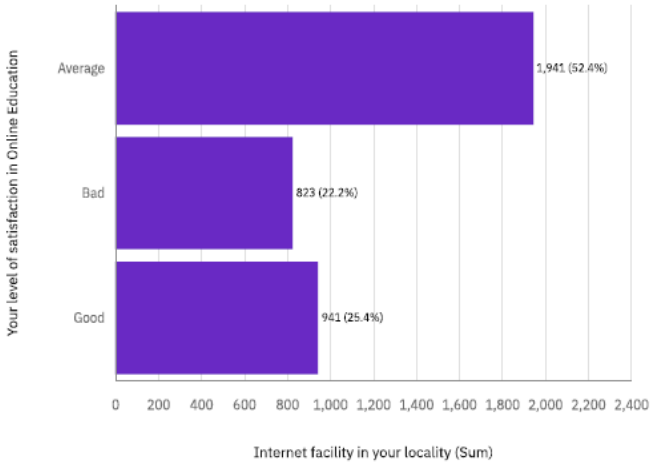


Result - Dashboard

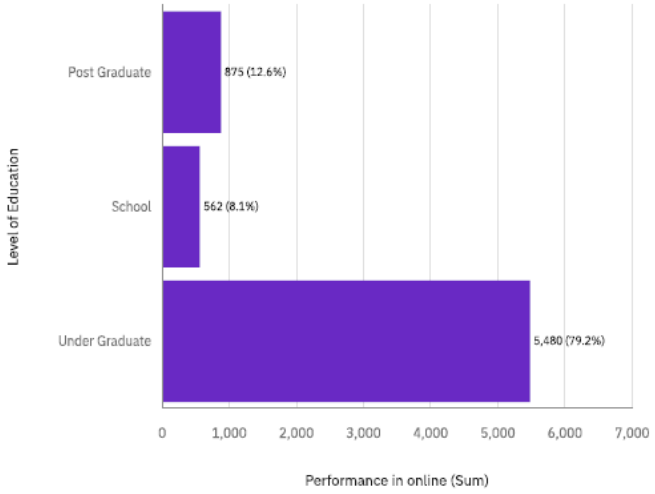
Age(Years) by Your level of satisfaction in Online Education



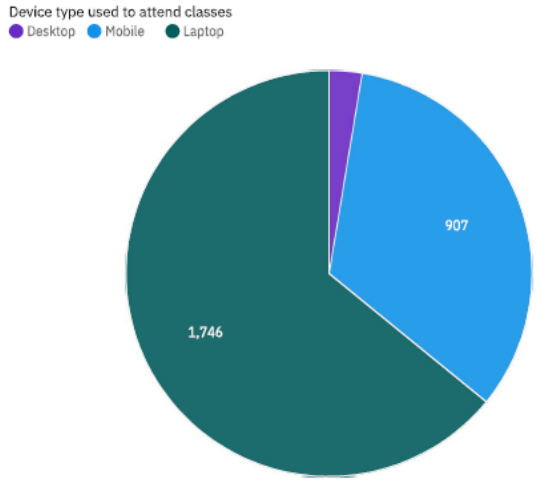
Internet facility in your locality by Your level of satisfaction in Online Education



Performance in online by Level of Education



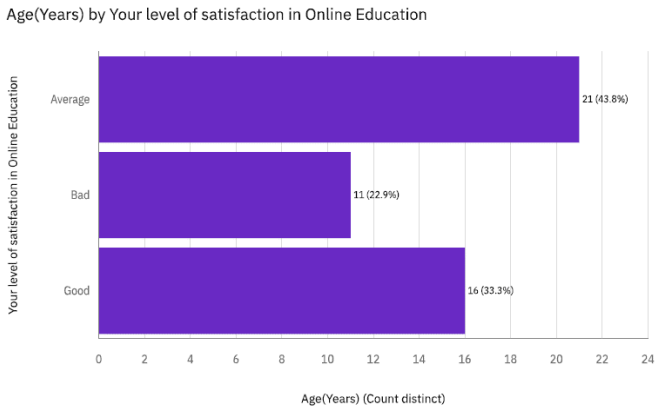
Time spent on social media (Hours) by Device type used to attend classes



Result - Story

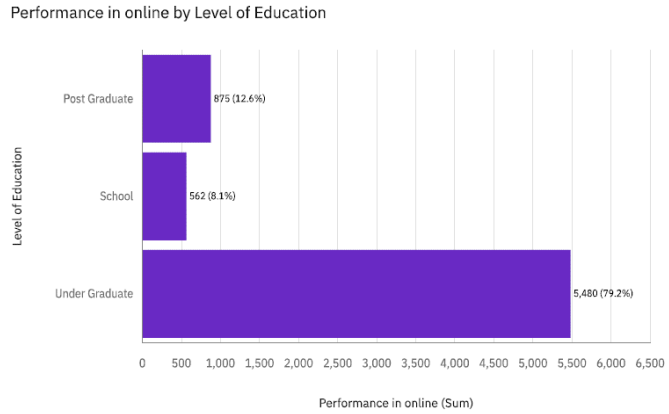
Age (Years) by Your level of satisfaction in Online Education

- This is the horizontal bar chart.
- In this bar chart, it is observed that the level of satisfaction "Average" has the highest value (43.8%) at the age of 21.
- Similarly, the level of satisfaction "Bad" has the lowest value (22.9%) at the age of 11.



Performance in online by Level of Education

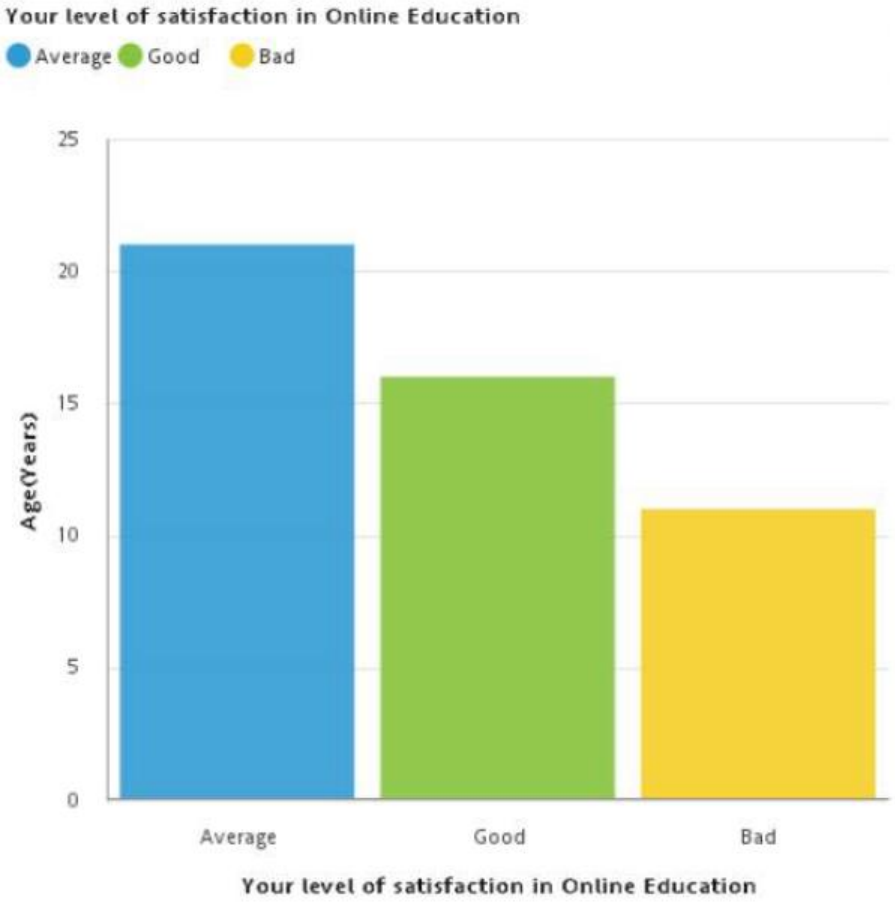
- This is a horizontal bar chart.
- In this bar chart, it is observed that the Level of Education "Under Graduate" has the highest value (5,480) at Performance in Online.
- Similarly, it is observed that the Level of Education "School" has the lowest value (562) at Performance in Online.



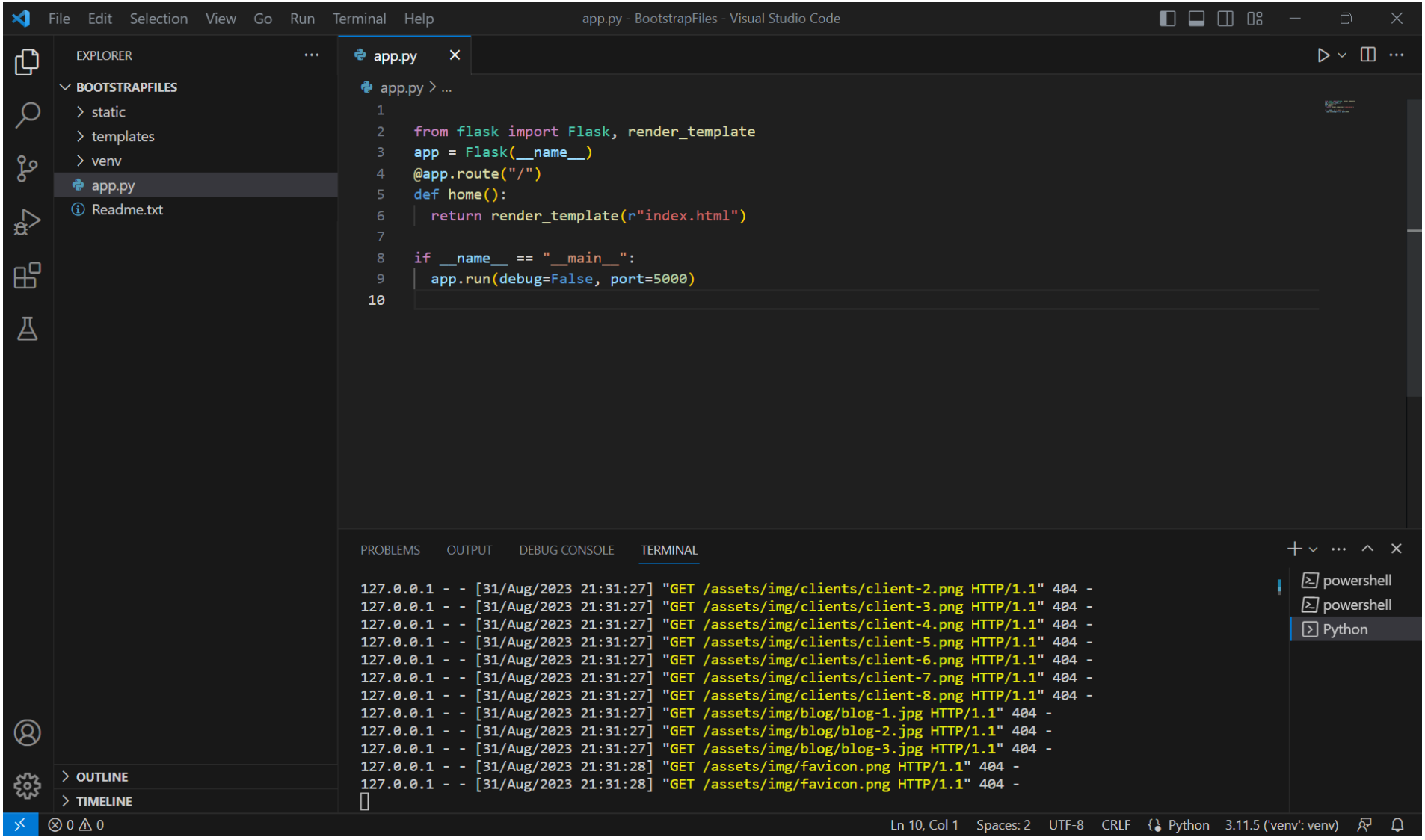
Result - Report

Online Education Report

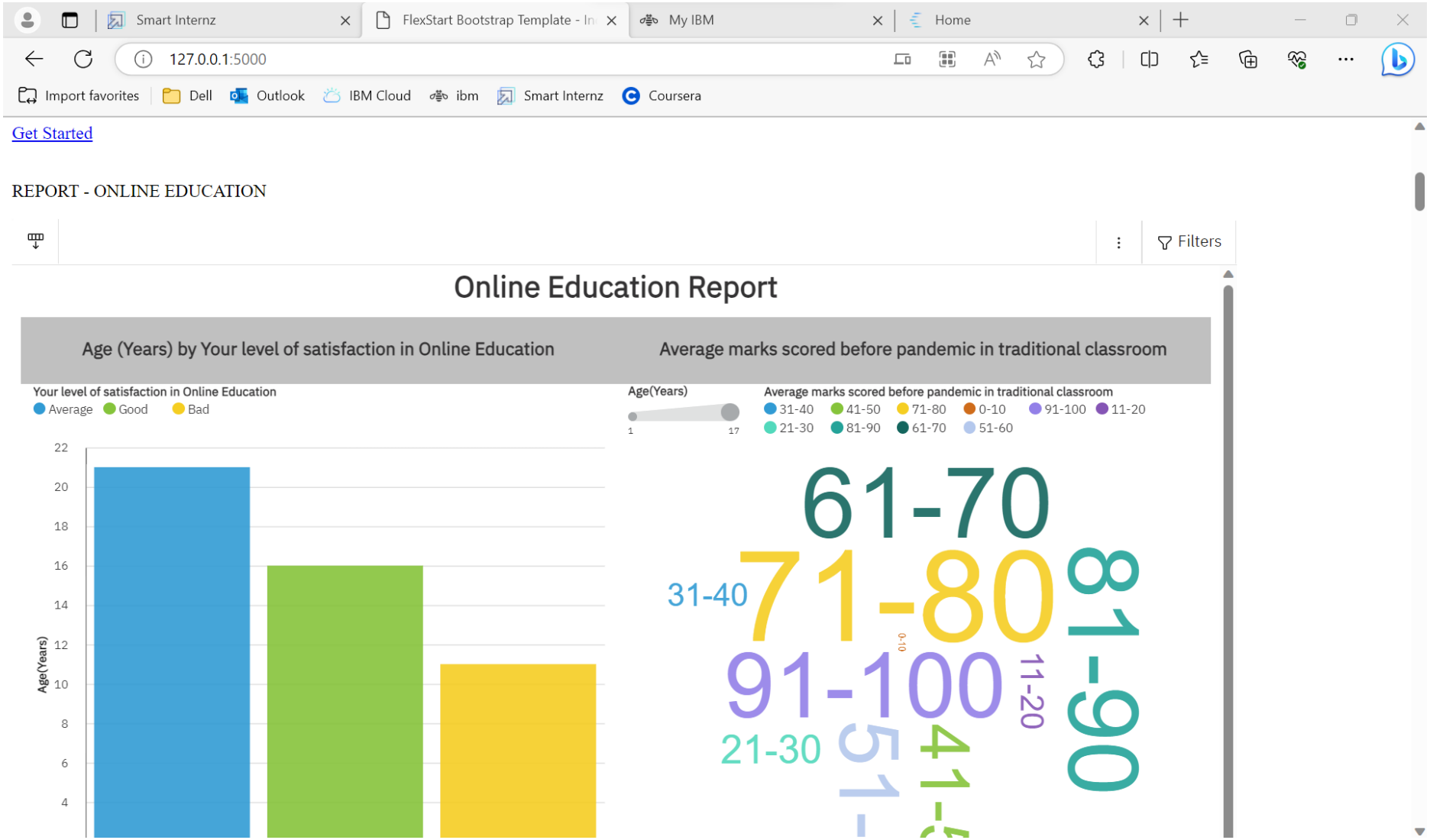
Age (Years) by Your level of satisfaction in Online Education	Average marks scored before pandemic in traditional classroom



Result – Web Integration using Flask



Result – Web Integration using Flask



Advantages and Disadvantages

Advantages

- Enhanced online learning
- Informed decision-making
- Improvement in curriculum design
- Advancement in research

Disadvantages

- Difficulty of adapting to technology integration
- Limited generalization of insights
- Analysis of different learning styles of learners
- Loss of on-campus study experience

Applications

- Integration of technology in educational institutions.
- Enables educational institutes to understand student learning behavior, design the curriculum, and policy-making.
- Implementation of innovative pedagogical strategies.
- Helps educators and researchers.
- Helps in finding ways to keep the students motivated and engaged in online learning.

Conclusion

- The key findings and insights in online education are the impact on education, motivation, and learning behavior.
- A clear understanding of the insights gained from the analysis and inspire them to take action in advancing online education.

Future Scope

- Innovation in pedagogical practices
- Long-term analysis of online education
- Implementation of effective assessment methods
- Robust learning analytics
- Ethical practices in learning

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Thank You