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The Prediction Of Mobile Addiction For Teenagers Using Machine Learning Models

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Abstract: After the covid – 2019, Everyone is busy with online activities. In India, the teenager percentage is 10-19 so many activities are related to mobile. Challenging mobile use plays an important role in public health and is linked with deprived mental health outcomes. A sample size of 398 was used to observe and check mobile addiction in a few phenomena. Machine learning helps to predict teenagers' addiction to mobile. We will try too many algorithms to check for predictions based on real data for some realistic scenarios. And we will get the best results in terms of slabs.

Index Terms – DSM-5, MS-Excel, Google form, Jupyter-Notebook, PyCharm, Machine Learning Algorithms and python library

I. INTRODUCTION

The worldwide social issue is the use of mobile in the current dilemma. Mobile addiction is a big problem for our teenagers based on multiple factors primarily social networking (WhatsApp, Meta, etc.), the need is for knowledge from the internet as well as worldwide level competition. Mobile addiction consists of four mechanisms, tolerance, withdrawal, obsessive symptoms, and functional impairment, according to our previous factor analysis of the Smartphone Addiction Inventory [1]. Mobile has various applications to the joy of time like social networking connection eventually or need-based. For teenagers Implement educational programs to raise awareness about the risks of internet addiction promote healthy internet use and provide accessible mental health services and support for students struggling with internet addiction and depression [2]. Teenagers are busy playing online games, hypothetically addicted by games [3].

We covered a normal introduction, and then In the second section we will review various research which helped me a lot to create the topic and idea of research to be done based on the papers learned, third section actual work research method and explanations of our work and agenda of the research, fourth section results of research to be done by us with the web user interface at last conclusion and future work

II. LITERATURE REVIEW

Now the era of mobile we are trying the theory of mobile user for impact of life helps to improve nation build healthy and creative.

In “Issues for DSM-V: Internet Addiction" [4] the editorial argues that internet addiction deserves to be included as a diagnosis in the DSM-V, the manual is used to diagnose mental disorders. Internet addiction shares characteristics with other impulse-control disorders, Symptoms include excessive use, withdrawal symptoms, tolerance, and negative consequences, South Korea considers internet addiction a major public health issue and has implemented treatment programs, Accurate data on prevalence in the US is lacking due to factors like shame and comorbidity (having other mental health conditions), Internet addiction can be resistant to treatment and worsen other mental health issues and additionally Dr. Jerald Block, “acknowledges cultural differences in internet use but believes the core issue” The editorial mentions estimates that 2.1% of South Korean children (ages 6-19) are addicted and require treatment and China has also taken steps to address internet addiction with regulations on gaming time.

In" Internet Addiction: A Clinical Perspective" [5] Kuss has provided a comprehensive clinical perspective on Internet addiction, exploring its symptoms, causes, and consequences. Her research has helped to define the problem and identify potential treatment approaches. Defining Internet Addiction: While the exact criteria for internet addiction are still debated, Kuss's work has been instrumental in developing diagnostic framework and assessment tools and Comorbidity- Kuss has investigated the relationship between internet addiction and other mental health disorders, highlighting the importance of a holistic approach to treatment.

In" **Machine Learning: Algorithms, Real-World Applications and Research Directions**" [6] many paper reviews and give some important information below:

Machine learning is a subset of artificial intelligence (AI) that enables systems to learn and improve from experience without being explicitly programmed. Highlights the growing importance of ML in various industries due to its ability to handle large amounts of data and insight patterns.

2.1 Machine Learning Algorithms

- **Supervised Learning**: Discusses algorithms such as linear regression, logistic regression, support vector machines (SVM), and neural networks. These algorithms learn from labelled data to make predictions or classify data points.
- **Unsupervised Learning**: Covers clustering algorithms like k-means and hierarchical clustering, as well as **association rule learning.** These algorithms deal with unlabeled data to find hidden patterns.
- **Semi-supervised Learning**: A blend of supervised and unsupervised learning, used when labelled data is scarce.
- **Reinforcement Learning**: Explains how agents learn to make decisions by performing actions in an environment to maximize cumulative reward, citing examples like Q-learning and deep reinforcement learning.

2.2 Real-World Applications

- **Healthcare**: Application of ML in disease prediction, medical image analysis, and personalized treatment plans.
- **Finance**: Use of ML for credit scoring, fraud detection, and algorithmic trading.
- **Retail**: Implementation in customer segmentation, recommendation systems, and inventory management.
- **Transportation**: Applications in autonomous vehicles, traffic prediction, and route optimization.
- **Cybersecurity**: ML for anomaly detection, intrusion detection systems, and malware classification.

2.3 Challenges and Research Directions

- **Data Quality and Quantity**: Challenges related to the availability of high-quality labeled data and the need for large datasets to train robust models.
- **Model Interpretability**: The need for developing interpretable models that provide insights into decision-making processes.
- **Scalability**: Ensuring ML models can handle large-scale data efficiently.
- **Ethical and Social Implications**: Addressing issues such as bias, fairness, and privacy concerns in ML applications.
- **Hybrid Models**: Future research could focus on combining different learning paradigms to enhance model performance.

In "Machine Learning in Psychometrics and Psychological Research" [7], the authors explain various connections between machine learning and psychometrics theory. Some psychological research first involves machine learning, which can analyze huge amounts of data (e.g., social media, text messages) to predict personality traits. Second Clinical Psychology ML can aid in the early detection and diagnosis of mental

health disorders by analyzing patient data and last Neuroscience ML can be used to analyze brain imaging data to understand cognitive processes and neural correlates of behavior

In" Reproducibility in Machine Learning for Health "[8] the Authors Machine learning algorithms designed to characterize, monitor, and intervene on human health are expected to perform safely and reliably when operating at scale, potentially outside strict human supervision. This requirement warrants a stricter attention to issues of reproducibility than other fields of machine learning

III. RESEARCH METHODOLOGY

In this topic we found the mixed-method approach combines quantitative and qualitative research to provide a comprehensive understanding of mobile addiction among teenagers. This integration ensures that the study captures both measurable patterns and contextual nuances.

Quantitative Data Analysis involves collecting numerical data through surveys and digital tracking tools. Validated scales, such as the Smartphone Addiction Scale (SAS), are employed to measure addiction levels, screen time, and app usage. Statistical techniques, including regression analysis and machine learning models, identify significant predictors and establish relationships between variables like screen time, sleep quality, and academic performance. This data-driven approach allows for pattern recognition and the development of predictive frameworks.

Qualitative Insights are gathered through interviews and focus group discussions. Semi-structured interviews with teenagers, parents, and professors explore personal experiences, motivations, and perceptions of mobile usage. Focus groups delve into peer influences, emotional connections to mobile devices, and coping mechanisms. These methods provide depth and context, revealing underlying factors not easily quantifiable.

The integration of these methods enables triangulation, enhancing the reliability and validity of findings. Quantitative results offer broad generalizations, while qualitative insights provide detailed narratives, creating a holistic understanding of mobile addiction.

3.1 Research Design

The **exploratory** and **predictive** approaches in research are complementary strategies that provide a comprehensive understanding of complex phenomena like mobile addiction among teenagers.

Exploratory Research is the initial phase, focusing on uncovering patterns, relationships, and underlying factors associated with mobile addiction. This phase involves qualitative methods such as interviews, focus groups, and thematic analysis. Through open-ended questions and discussions, researchers gather insights into teenagers' behaviors, motivations, and emotional connections with mobile devices. Exploratory research helps to identify potential predictors of addiction, such as excessive social media use, gaming habits, and sleep disturbances, forming the foundation for further investigation.

Predictive Research builds on the findings of the exploratory phase by using quantitative methods and advanced data analytics. Statistical models and machine learning algorithms are employed to analyze data collected from surveys and digital tracking tools. Techniques like regression analysis, decision trees, and neural networks help predict the likelihood of mobile addiction based on identified predictors. These models provide actionable insights, enabling early detection of at-risk individuals and the development of targeted interventions.

The integration of exploratory and predictive approaches ensures a robust research framework. While exploration uncovers new knowledge, prediction applies it, offering practical solutions for managing mobile addiction among teenagers.

Surveys and questionnaires are essential tools for collecting data in research, particularly when studying mobile addiction among teenagers. These methods allow researchers to gather large amounts of data efficiently, providing a quantitative foundation for analysis.

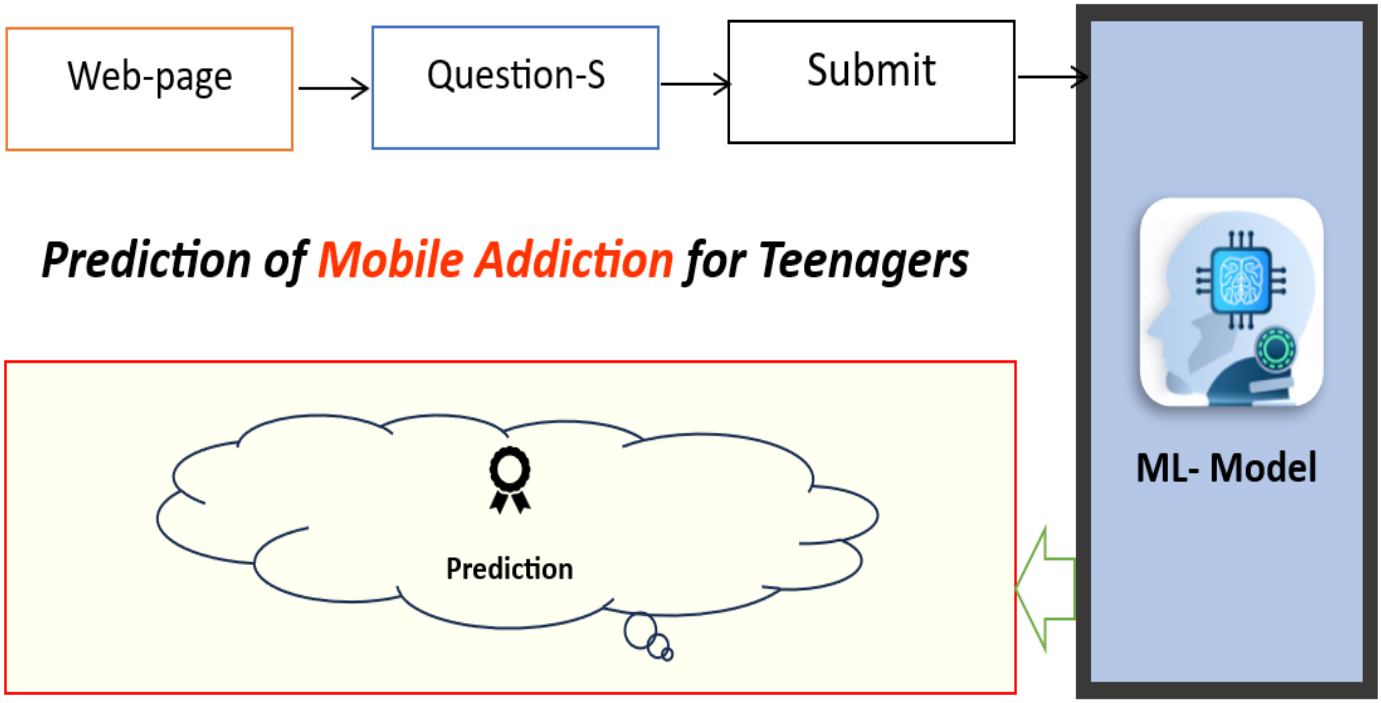


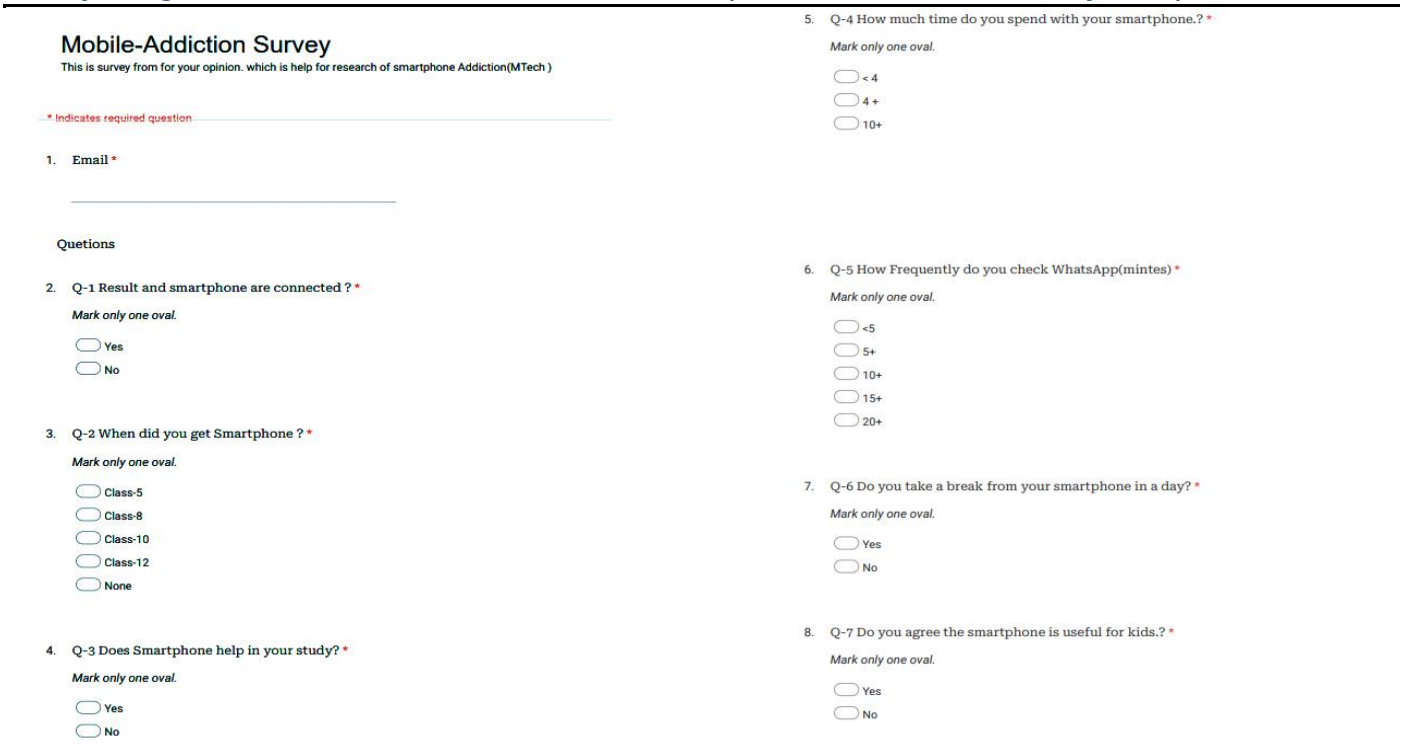
Figure 1 Research design

3.2 Surveys and Questionnaires

Surveys are structured instruments designed to collect standardized information from a broad audience. They typically include closed-ended questions with predefined response options, such as Likert scales, to measure variables like screen time, app usage patterns, and addiction levels. Surveys can be distributed online, making them accessible to a diverse population of teenagers. Tools like **Google Forms** or Survey facilitate easy distribution and data aggregation.

Questionnaires, a subset of surveys, are more detailed and can include a mix of closed and open-ended questions. Validated scales, such as the **Smartphone Addiction Scale (SAS) or Mobile Phone Problematic Use Scale (MPPUS),** can be integrated into the questionnaire to assess addiction severity. Open-ended questions explore subjective experiences, allowing participants to describe their emotional dependence on mobile devices or the impact on their daily lives.

These methods are cost-effective, scalable, and versatile, making them ideal for identifying patterns and relationships among variables. By ensuring anonymity and designing questions thoughtfully, researchers can collect accurate, reliable data, forming the basis for **predictive modelling** and actionable insights.



Mobile-Addiction Survey

This is survey from for your opinion. which is help for research of smartphone Addiction(MTech)

* Indicates required question

1. Email *

Quetions

2. Q-1 Result and smartphone are connected ? *
Mark only one oval.
Yes
No

3. Q-2 When did you get Smartphone ? *
Mark only one oval.
Class-5
Class-8
Class-10
Class-12
None

4. Q-3 Does Smartphone help in your study? *
Mark only one oval.
Yes
No

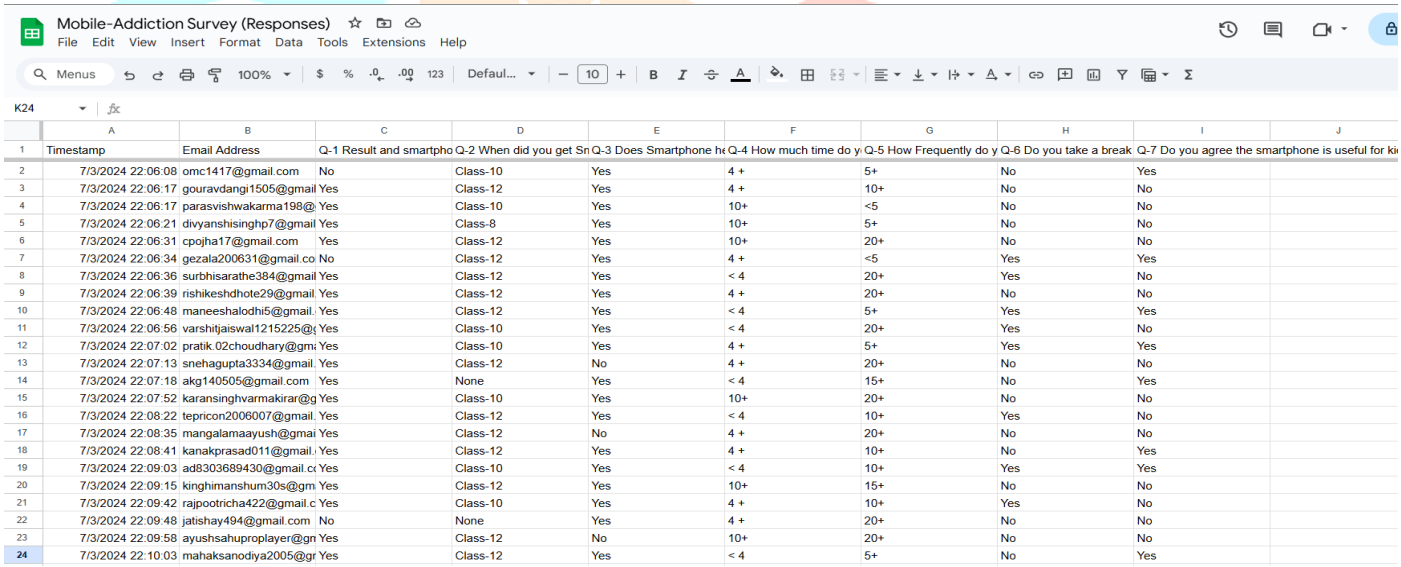
5. Q-4 How much time do you spend with your smartphone.? *
Mark only one oval.
< 4
4 +
10+

6. Q-5 How Frequently do you check WhatsApp(mintes) *
Mark only one oval.
<5
5+
10+
15+
20+

7. Q-6 Do you take a break from your smartphone in a day? *
Mark only one oval.
Yes
No

8. Q-7 Do you agree the smartphone is useful for kids.? *
Mark only one oval.
Yes
No

Figure 2 Google Form



Mobile-Addiction Survey (Responses)

File Edit View Insert Format Data Tools Extensions Help

	A	B	C	D	E	F	G	H	I	J
1	Timestamp	Email Address	Q-1 Result and smartpho	Q-2 When did you get Sn	Q-3 Does Smartphone he	Q-4 How much time do y	Q-5 How Frequently do y	Q-6 Do you take a break	Q-7 Do you agree the smartphone is useful for ki	
2	7/3/2024 22:06:08	omc1417@gmail.com	No	Class-10	Yes	4 +	5+	No	Yes	
3	7/3/2024 22:06:17	gouravdangi1505@gmail	Yes	Class-12	Yes	4 +	10+	No	No	
4	7/3/2024 22:06:17	parasvishwakarma198@	Yes	Class-10	Yes	10+	<5	No	No	
5	7/3/2024 22:06:21	divyanshisinghp7@gmail	Yes	Class-8	Yes	10+	5+	No	No	
6	7/3/2024 22:06:31	cpojha17@gmail.com	Yes	Class-12	Yes	10+	20+	No	No	
7	7/3/2024 22:06:34	gezala200631@gmail.co	No	Class-12	Yes	4 +	<5	Yes	Yes	
8	7/3/2024 22:06:36	surbhisarathe384@gmail	Yes	Class-12	Yes	< 4	20+	Yes	No	
9	7/3/2024 22:06:39	rishikeshdhote29@gmail.	Yes	Class-12	Yes	4 +	20+	No	No	
10	7/3/2024 22:06:48	maneeshalodhi5@gmail.	Yes	Class-12	Yes	< 4	5+	Yes	Yes	
11	7/3/2024 22:06:56	varshitjaiswal1215225@(	Yes	Class-10	Yes	< 4	20+	Yes	No	
12	7/3/2024 22:07:02	pratik.02choudhary@gm	Yes	Class-10	Yes	4 +	5+	Yes	Yes	
13	7/3/2024 22:07:13	snehagupta3334@gmail.	Yes	Class-12	No	4 +	20+	No	No	
14	7/3/2024 22:07:18	akg140505@gmail.com	Yes	None	Yes	< 4	15+	No	Yes	
15	7/3/2024 22:07:52	karansinghvarmakirar@g	Yes	Class-10	Yes	10+	20+	No	No	
16	7/3/2024 22:08:22	tepricon2006007@gmail.	Yes	Class-12	Yes	< 4	10+	Yes	No	
17	7/3/2024 22:08:35	mangalamaayush@gmai	Yes	Class-12	No	4 +	20+	No	No	
18	7/3/2024 22:08:41	kanakprasad011@gmail.(	Yes	Class-12	Yes	4 +	10+	No	Yes	
19	7/3/2024 22:09:03	ad8303689430@gmail.c	Yes	Class-10	Yes	< 4	10+	Yes	Yes	
20	7/3/2024 22:09:15	kinghimanshum30s@gm	Yes	Class-12	Yes	10+	15+	No	No	
21	7/3/2024 22:09:42	rajpootricha422@gmail.c	Yes	Class-10	Yes	4 +	10+	Yes	No	
22	7/3/2024 22:09:48	jatishay494@gmail.com	No	None	Yes	4 +	20+	No	No	
23	7/3/2024 22:09:58	ayushsahuproplayer@gn	Yes	Class-12	No	10+	20+	No	No	
24	7/3/2024 22:10:03	mahaksanodiya2005@gr	Yes	Class-12	Yes	< 4	5+	No	Yes	

Figure 3 Google Form response

3.2.1 Prerequisite data

After the collected data convert the form to base on data for modeling

Prerequisite Data

Question	Result and smartphone are connected ?	Score	When did you get Smartphone	Score	Smartphone helps your study?	Score	How much time spend your smartphone.(Hour/Day)	Score	What's time to check the WhatsApp(mintes)	Score	Do you leave the smartphone in a day?	Score	Are you agree the smartphone useful for kids.?	Score
Abbreviation	RS		Get_Mobile		Help_Study		Time_Spend		Time_Use_Wh		M_Leave		U_Kids	
	Yes	1	Class-12	1	Yes	1	<4	0	<5	4	Yes	1	Yes	1
	No	0	Class-10	2	No	0	4+	1	5+	3	No	0	No	0
			Class-8	3			10+	2	10+	2				
			Class-5	4					15+	1				
			None of Above	0					20+	0				

Figure 4 Concerted based on – DSM

Score	0	1	2	3	4	5	6	7	8	9	10	11	12
Mobile Addiction	Low			Low-Medium		Medium		Above Medium		High		Extreme High	

Figure 5 Score and results

3.3 ML cycle and Model

3.3.1 ML Cycle

The machine learning cycle is a key role for any kind of projected agenda. So now here I had to add an image to project my working how to work with our data and get the results.

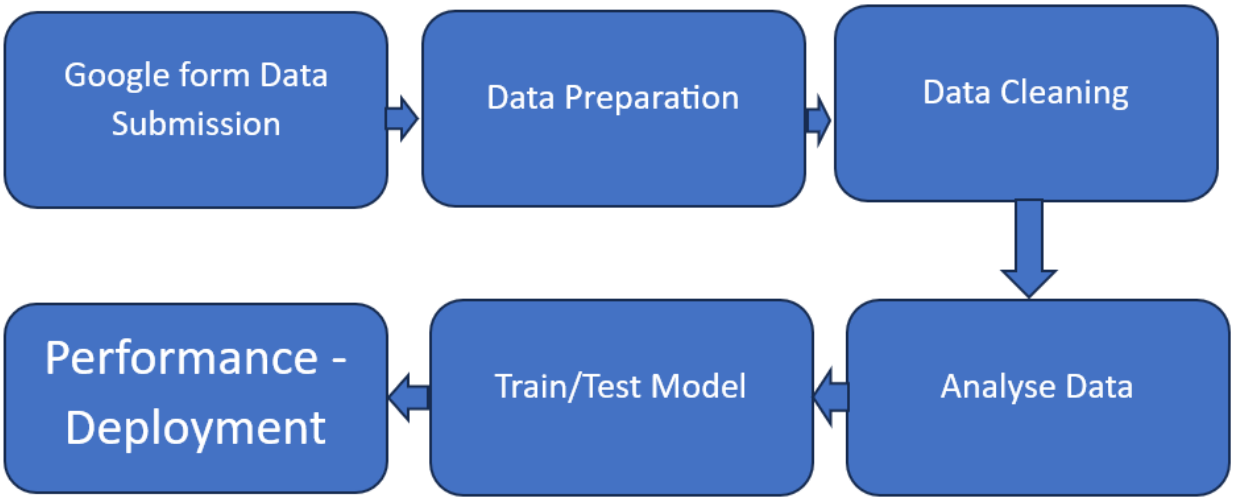


Figure 6 Our Model ML-Cycle

3.3.2 Model Selection and Evolution

Model selection is the process of choosing the best machine learning algorithm based on the dataset characteristics, problem type, and performance metrics. The goal is to find a model that generalizes well to unseen data while maintaining efficiency, in what kind of data we are use in the model and what's the problem we have it clear we are taking only based on Evolution Parameter Classification (Accuracy, Precision, Recall, F1-score), Regression (RMSE, MAE, R^2 Score), Cross-validation (k-fold cross-validation)

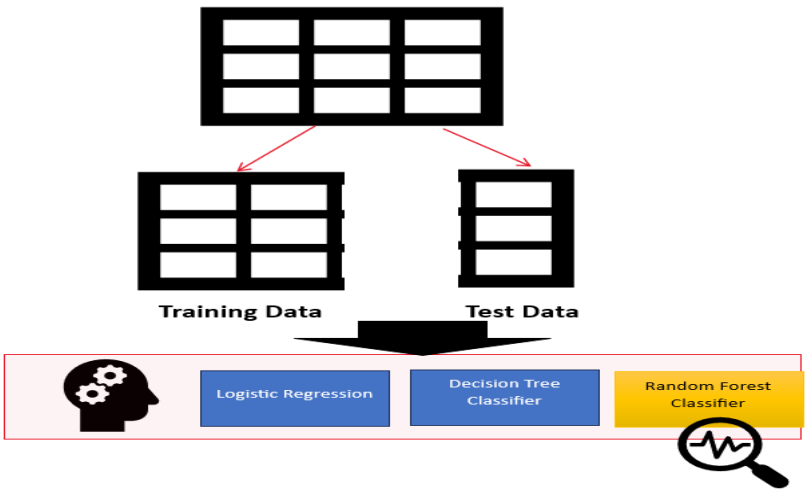


Figure 7 Deployment Model

IV. RESULTS

The results of this study demonstrate the effectiveness of AI and machine learning in predicting mobile addiction among teenagers based on behavioral, demographic, and psychological factors. The training and testing data included key factors and variables such as time, social media engagement, sleep patterns, academic performance, and self-reported addiction scores. Various machine learning algorithms were evaluated to determine the perfect accurate predictive model.

4.1 Performance of Machine Learning Models

The predictive performance of different models was assessed using standard evaluation metrics such as accuracy. The results are summarized in the table below:

Model	Accuracy (%)
Logistic Regression	49
Decision Tree	64
Random Forest	82

Among the tested models, the Random Forest Classifier reached the highest accuracy of 82%, making it the most reliable approach for mobile addiction prediction.

4.2 Feature Importance Analysis

To identify the most influential factors contributing to mobile addiction, feature importance was analyzed. The top features contributing to prediction accuracy included:

- **Screen Time per Day** – Higher screen time correlated strongly with addiction tendencies.
- **Social Media Usage** – Frequent engagement with social media platforms significantly impacted addiction levels.
- **Sleep Patterns** – Reduced sleep hours and sleep disturbances were associated with higher addiction risk.
- **Academic Performance** – A decline in academic performance was observed in individuals with excessive mobile usage.

Machine learning can be an effective tool for early detection of Mobile Addiction among teenagers. The study focuses the critical role of behavioral and lifestyle factors in addiction prediction, providing valuable insights for parents, instructors, and representatives to design preventive strategies.

V. CONCLUSION AND FUTURE WORK

This study explored the application of machine learning techniques to predict mobile addiction among teenagers based on behavioral, demographic, and psychological factors by classification models, we demonstrated that machine learning can effectively identify patterns associated with excessive mobile usage. Our findings indicate that factors such as screen time, social media engagement, and education effect significantly contribute to mobile addiction prediction. Among the evaluated models random forest classifier achieved the highest accuracy, highlighting its potential for real-world implementation.

The results underscore the importance of early detection and intervention strategies to mitigate the negative consequences of mobile addiction. Colleges even schools, parents, and mentors can leverage these predictive models to implement targeted awareness programs and encourage healthier digital habits among teenagers.

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