

## Pharmacological Prediction

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### INTRODUCTION

#### Aim

In general, the aim of this project is to develop a model that can be used in a clinical setting to assist physicians in making more informed decisions about which drugs to prescribe to their patients. This model could be a valuable tool for improving patient outcomes and reducing healthcare costs by helping to ensure that patients are prescribed the most appropriate drugs for their specific health conditions.

#### About the Project

The proper selection of drugs is crucial for the treatment of various health conditions. However, due to the large number of available drugs and the complexity of the human body, it can be challenging for physicians to make informed decisions about which drugs to prescribe to their patients. This is particularly true for patients with multiple health conditions and those who have not responded well to previous treatments.

Machine learning provides a powerful tool for addressing this problem by allowing us to analyze large amounts of data and make predictions about which drugs are most likely to be effective for a given patient. By using patient characteristics and laboratory test results as features, we can train models that can predict which drugs are most appropriate for specific health conditions.

This project aims to use machine learning techniques to classify drugs based on their effects on specific health conditions. We will use a dataset containing patient characteristics (Age, Sex) and laboratory test results (Blood Pressure, cholesterol level, Na to K ratio) and the label (Drug type). The goal is to use these features to predict which type of drug would be most appropriate for a given patient. The project will involve loading the dataset,

cleaning and preprocessing the data, selecting and training a classification algorithm, evaluating the model's performance, and optimizing the model. The final model could be used in a clinical setting to assist physicians in making more informed decisions about which drugs to prescribe to their patients, and ultimately improve patient outcomes and reduce healthcare costs

### EXISTING SYSTEM

The existing system for drug selection typically involves physicians using their own knowledge and experience, as well as guidelines and clinical practice recommendations, to make decisions about which drugs to prescribe to their patients. This approach can be effective, but it is also subject to human error and bias. Additionally, it may not take into account all relevant information about the patient, such as lab test results or other health conditions

### Proposed System

The proposed system is expected to have several advantages over the existing system. First, by using machine learning, the proposed system can analyze large amounts of data and make predictions based on patterns that may not be apparent to human experts. Second, by using lab test results as features, the proposed system can take into account information about the patient's health that may not be available to physicians through other means. And third, by providing physicians with a more objective basis for making decisions about which drugs to prescribe, the proposed system can help to reduce human error and bias.

### SYSTEM REQUIREMENTS SPECIFICATION

#### Functional Requirements

A functional system requirement specification (SRS) is a document that describes the functional requirements of a system. It outlines what the system is expected to do, and how it will do it. The following are some key sections that should be included in a functional SRS for this project:

**Introduction:** This section should provide an overview of the project, including the purpose and scope of the system.

**User requirements:** This section should describe the users of the system, their needs and how the system will meet those needs.

**System features:** This section should describe the functional requirements of the system, including the input and output data, the algorithms used, and any other relevant features.

**Performance requirements:** This section should describe the performance requirements for the system, including accuracy, response time, and scalability.

**User interface:** This section should describe the user interface requirements, including the layout, navigation, and ease of use.

**Security and compliance:** This section should describe the security and compliance requirements for the system, including data encryption, authentication, and access controls.

**System integration:** This section should describe how the system will integrate with other systems and data sources.

**Deployment and maintenance:** This section should describe the requirements for deploying the system and maintaining it over time.

**Appendices:** This section should include any additional information or documents that are relevant to the project, such as flowcharts, diagrams, or test results.

It's worth noting that the above sections are common in functional SRS and that the specific content and format may vary depending on the specific project. The SRS should be written in clear and concise language, and should be reviewed and approved by all stakeholders before development begins. This will ensure that the system being developed meets the needs of the user

and other stakeholders, and that it will work as intended when it is deployed.

### **Non-Functional Requirements**

A non-functional system requirement specification (SRS) is a document that describes the non-functional requirements of a system. These requirements specify the system's quality attributes, such as reliability, availability, scalability, and security. The following are some key sections that should be included in a non-functional SRS for this project:

**Usability:** This section should describe the usability requirements for the system, including ease of use, learnability, and error recovery.

**Reliability:** This section should describe the reliability requirements for the system, including availability, fault tolerance, and recovery from failures.

**Performance:** This section should describe the performance requirements for the system, including response time, throughput, and scalability.

**Security:** This section should describe the security requirements for the system, including data encryption, authentication, and access controls.

**Supportability:** This section should describe the requirements for maintaining and updating the system over time, including ease of deployment, monitoring, and troubleshooting.

**Compliance:** This section should describe the compliance requirements for the system, including adherence to relevant laws and regulation

### **TESTING**

Testing is a main part of any project development cycle. A project is incomplete without successful testing and implementation. A program or system design only when communication between the user and the designer is complete and clear. A successful system design helps in efficient testing and

implementation. Testing is vital to the success of a system. This chapter concentrates on testing conducted on the project. Testing has helped in developing and improving the project.

During the testing, the program to be tested is executed with a set of test cases and the output of the program for the test cases is evaluated to determine whether the program is performing as expected. Errors were found and corrected by using the following testing steps and correction was recorded for future references.

Since in this project is a network based system the test cases are derived. Testing is a process of exercising software with an intent of finding errors. The fundamental philosophy for testing a network based application which works on different computer on different platforms in a heterogeneous environment.

The approach for network based system testing adapts the basic principles for all software testing. The following steps summarizes the approach.

The content model of the application is reviewed to uncover errors. The “Testing” activity is similar in many respects to copy editing a written document. In fact, while building a large application it might require the service of a professional copy editor to uncover typographical error, grammatical errors in content, consistency, error in graphical representation and cross referencing errors.

The design model for the application is reviewed to uncover navigational errors. Use- case, data flow derived as a part of the analysis activity, allows exercising each usage scenario against the architectural and navigation design. The navigation options provided are checked to review that they correspond to the specification path for each user role.

**SNAPSHOTS**

**INPUT PAGE  
 PREDICTION PAGE**

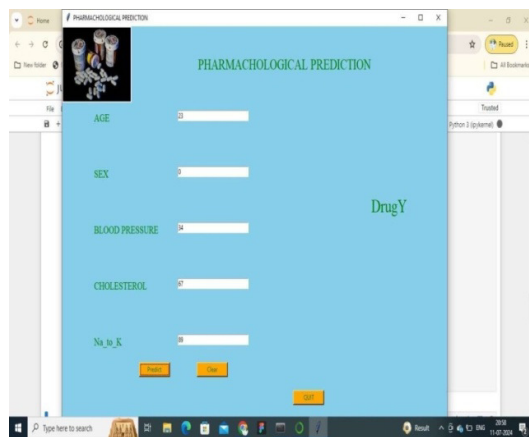
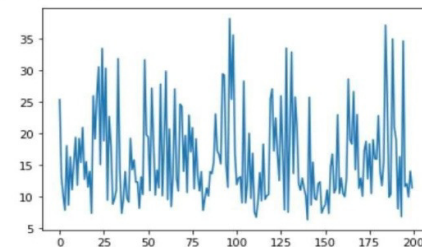


Fig 8.2: Prediction page

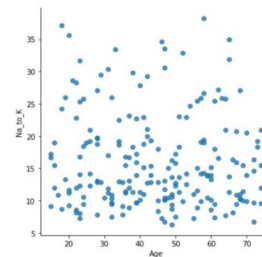
**Axis Subplot Graph:-** Subplots mean group of smaller axes (where each axis is a plot) that can exist together within a single figure. Think of a figure as a canvas that holds multiple plots.

```
In [8]: dataset['Na_to_K'].plot()
Out [8]: <AxesSubplot:>
```



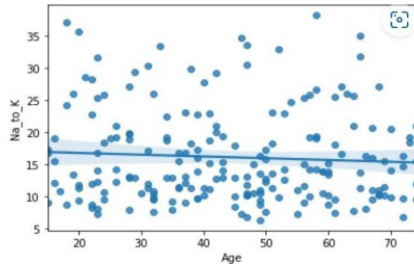
**Regplot Graph:-** regplot() method. Seaborn is a Python data visualization library based on matplotlib. It provides a high-level interface for drawing attractive and informative statistical graphics.

```
In [18]: sns.lmplot(x='Age', y='Na_to_K', data=dataset, fit_reg=False, legend=True)
Out [18]: <seaborn.axisgrid.FacetGrid at 0x1f05cb2c070>
```



```
In [9]: sns.regplot(x=dataset['Age'],y=dataset['Na_to_K'])
```

```
Out[9]: <AxesSubplot:xlabel='Age', ylabel='Na_to_K'>
```



**Implot Graph:-** The lineplot (lmlot) is one of the most basic plots. shows a line on a 2 dimensional plane. You can plot it with seaborn or It matplotlib depending on your preference.

**Histplot Graph:-** A histogram is a classic visualization tool that represents the distribution of one or more variables by counting the number of observations that fall within discrete bins.

### CONCLUSION

Pharmacological prediction is an important field of study in the pharmaceutical industry, as it helps to organize and categorize drugs based on their properties, uses, and potential risks. The classification of drugs is essential for their safe and effective use, as well as for the development of new drugs.

Drug prediction is a complex task that requires the integration of various data sources, including chemical and biological information, clinical data, and pharmacokinetic and pharmacodynamic data.

Machine learning algorithms have been used to classify drugs based on certain features, such as chemical structure, target proteins, and side effects, with promising results.

However, it's worth noting that drug classification is a complex field and this project is a simple demonstration of drug classification and it has some limitations in terms of the size of the dataset and the complexity of the algorithm used. Therefore, further research should be done to improve the performance of the algorithm by using larger datasets and more complex algorithms.

Overall, drug prediction is a crucial field of study that has the potential to improve the safety, efficacy, and development of drugs. It's essential to continue to research and develop new techniques to classify drugs more accurately and effectively

### BIBLIOGRAPHY

Website references

<https://www.tutorialspoint.com/index.htm>

<https://www.javatpoint.com>

<https://www.w3schools.com>

Available:<https://www.kaggle.com/ronitf/anemia-uci#anemia.csv>.

### Textbook referencesM8N7Y/

Think python: How to think like a computer scientist (2nd edition) by Allen B Downey.

Programming python from O'Reilly Media (4th edition) by Mark Lutz.

Python Data Science hand book: essential tool for working with Data (1st edition) by Jake Vander Plas.