

CHAPTER 3

SYSTEM ANALYSIS

The requirements for a system are the descriptions of what services the system should provide and the constraints on its operation. These requirements reflect the needs of customers for a system that serves a certain purpose such as controlling a device, placing an order, or finding information. The process of finding out, analyzing, documenting and checking these services and constraints is called requirements engineering.

Requirements Engineering Process consists of the following main activities:

- **Requirement Elicitation:** It is related to the various ways used to gain knowledge about the project domain and requirements. The various sources of domain knowledge include customers, business manuals, and the existing software of same type, standards and other stakeholders of the project.
- **Requirement specification:** This activity is used to produce formal software requirement models. All the requirements including the functional as well as the non functional requirements and the constraints are specified by these models in totality. During specification, more knowledge about the problem may be required which can again trigger the elicitation process.
- **Requirement verification and validation:** Verification refers to the set of tasks that ensure that the software correctly implements a specific function. Validation refers to a different set of tasks that ensures that the software that has been built is traceable to customer requirements. If requirements are not validated, errors in the requirement definitions would propagate to the successive stages resulting in a lot of modification and rework.
- **Requirement management:** Requirement management is the process of analysing, documenting, tracking, prioritizing and agreeing on the requirement and controlling the communication to relevant stakeholders. This stage takes care of the changing nature of requirements.

3.1 Software Requirements

- **Python 3** – It is an interpreted high level programming language for general purpose programming. Python has a design philosophy that emphasizes code readability and a syntax that allows programmers to express concepts in fewer lines of code. It provides

constructs that enable clear programming on both small and large scales. It supports multiple programming paradigms, including object oriented, imperative, functional and procedural, and has a large and comprehensive standard library.

- **Windows Operating System.**
- **Jupyter Notebook or Kaggle Notebook** - The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include:
data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more. Kaggle Notebook is a cloud computational environment that enables reproducible and collaborative analysis to explore and run machine learning code.
- **PyTorch** – It is an open-source machine learning library used for applications such as Computer Vision and Natural Language Processing.
- **Flask** – Flask is a lightweight WSGI web application framework. It is designed to make getting started quick and easy with the ability to scale up to complex applications. It began as a simple wrapper around Werkzeug and Jinja and has become one of the most famous Python web application frameworks.

3.2 Hardware Tools

- **Processor** – Intel core i3 or above.
- **RAM** – 4GB or above.
- **Storage** – 4GB or higher free hard drive space.

3.3 User Requirements

User Requirements Specification is written early in the validation process, typically before the system is created. They are written by the system owner and end-users, with input from Quality Assurance. Requirements outlined in the specification are usually tested in the Performance Qualification or User Acceptance Testing. User Requirements Specifications are not intended to be a technical document; readers with only a general knowledge of the system should be able to understand the requirements and hence are written in a natural language.

The user requirements identified with respect to our project may be listed as:

- The application shall classify eye images as keratoconus or not keratoconus.
- The application shall be secure and easy to use.