PYTHON PROGRAMMING FOR QR CODE GENERATOR USING GRAPHICAL USER INTERFACE

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report titled "**Python programming for qr code generator using graphical user interface(GUI)**" is the bonafide work of "**P. KHALEELAHAMED[192210363], T.VITHESH[192110114],N.SAICHANDU [192210137]**who carried out the project work under my supervision as a batch. Certified further, that to the best of my knowledge the work reported herein does not form any other project report.

Date: Subject Faculty: Head of the Department

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ABSTRACT

This project focuses on the development of a QR code generator using Python programming language with a Graphical User Interface (GUI). QR (Quick Response) codes have become ubiquitous in modern society, utilized for various purposes such as marketing, ticketing, inventory management, and more. While there are numerous online tools and libraries available for generating QR codes, creating a custom solution using Python provides flexibility and customization options. The proposed system employs Python's tkinter library for GUI development, providing users with an intuitive interface to input data and configure QR code parameters. The backend utilizes the qrcode library, a popular Python module for generating QR codes. Users can input text, URLs, contact information, or any other data supported by QR codes and generate corresponding QR images. This project presents a comprehensive solution for generating QR codes using Python programming language with a Graphical User Interface (GUI). QR codes have become indispensable tools in various domains, ranging from marketing to inventory management. By leveraging Python's tkinter library for GUI development and the qrcode library for QR code generation, this system offers users an intuitive interface to input data and customize QR code parameters. The GUI facilitates seamless interaction, allowing users to dynamically generate QR codes, preview them in real-time, and export them in different formats such as PNG, JPEG, or SVG. Robust error handling mechanisms ensure the application's reliability, while its cross-platform compatibility ensures usability across different operating systems. This project showcases Python's flexibility and versatility in creating tailored solutions for QR code generation, with potential for further enhancements and extensions to meet evolving user needs. The GUI allows dynamic QR code generation, enabling users to preview and customize codes in real-time. Export options provide flexibility, with support for various formats like PNG, JPEG, and SVG. Robust error handling mechanisms ensure the application's stability, enhancing user experience. Moreover, its cross-platform compatibility ensures accessibility across different operating systems, making it a versatile tool for users across industries. This project highlights Python's adaptability in crafting tailored solutions for QR code generation, with scope for future enhancements and extensions to meet evolving demands effectively.

Keywords: Python programming, QR code generator, Graphical User Interface (GUI), tkinter library, Qr code library, Data input, Customization, Real-time preview

CHAPTER 1
INTRODUCTION

In today's digital landscape, Quick Response (QR) codes have emerged as a ubiquitous tool for encoding information in a compact and versatile format. From marketing campaigns to inventory management systems, QR codes find applications in diverse domains due to their ability to store various types of data, including URLs, text, contact information, and more. As the demand for QR codes continues to grow, there arises a need for efficient and customizable solutions for their generation. Python, with its rich ecosystem of libraries and tools, presents an ideal platform for developing such solutions. This project aims to harness the power of Python programming language to create a QR code generator equipped with a Graphical User Interface (GUI), offering users an intuitive and seamless experience in generating QR codes tailored to their specific requirements.

The project revolves around the fusion of two essential components: the graphical interface for user interaction and the backend for QR code generation. The graphical interface is developed using Python's tkinter library, renowned for its simplicity and ease of use in creating GUI applications. It provides users with a visually appealing platform to input data, configure QR code parameters, and initiate code generation. Leveraging tkinter's capabilities, the interface is designed to be intuitive, ensuring that users can navigate through the process with minimal effort. At the heart of the system lies the QR code generation engine, powered by the qrcode library. This library offers comprehensive functionalities for creating QR codes programmatically, allowing for customization of parameters such as size, error correction level, and output format. By integrating qrcode seamlessly into the Python environment, the project enables dynamic QR code generation, enabling users to witness real-time previews of their codes as they tweak various settings through the GUI.

One of the project's key highlights is its emphasis on user-friendliness and flexibility. The GUI provides a streamlined workflow, guiding users through the QR code generation process step by step. Moreover, it offers export options, allowing users to save their generated codes in popular formats such as PNG, JPEG, or SVG, catering to different use cases and integration requirements. Additionally, robust error handling mechanisms are implemented to ensure the application's stability and reliability, enhancing the overall user experience.

Furthermore, the project prioritizes cross-platform compatibility, ensuring that the QR code generator can be deployed seamlessly across various operating systems, including Windows, macOS, and Linux. This aspect enhances the accessibility and usability of the application, making it accessible to a broader audience across different environments.In summary, this project exemplifies the synergy between Python programming and GUI development in creating a powerful QR code generator. By leveraging Python's strengths in simplicity, versatility, and cross-platform compatibility, the project offers a compelling solution for users seeking an efficient and customizable tool for QR code generation.

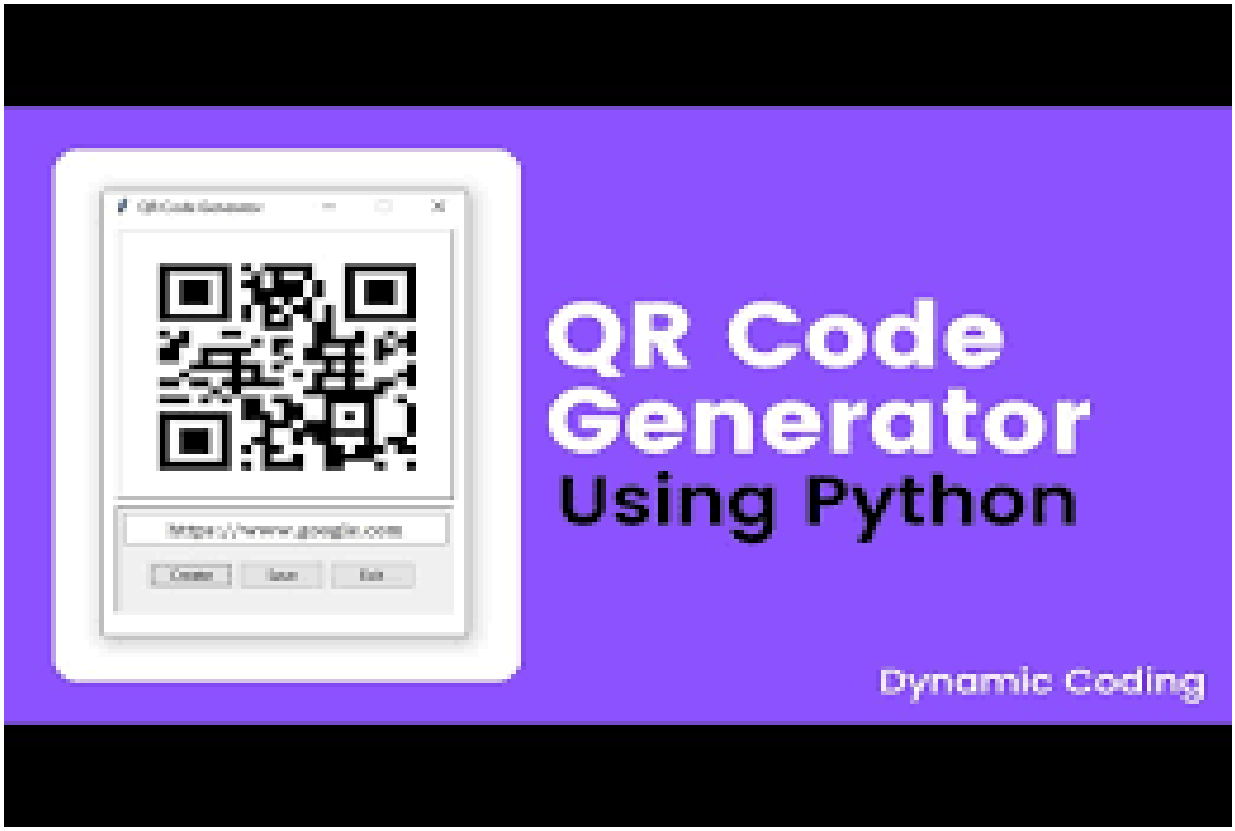


Figure 1: QR code Generator

In an increasingly digital world, the utility and prevalence of Quick Response (QR) codes have skyrocketed, permeating numerous facets of modern life, from advertising to inventory management. This report delves into the development and implementation of a Python-based QR code generator equipped with a Graphical User Interface (GUI), aimed at providing users with a seamless and intuitive platform for QR code creation.The project's primary objective is to leverage Python's versatility and ease of use to develop a robust QR code generator that caters to various user requirements. With a focus on simplicity, flexibility, and user experience,

the system integrates a graphical interface using the tkinter library, known for its efficiency in GUI development.

The tkinter interface enables users to interact with the QR code generator effortlessly, facilitating data input, parameter configuration, and code generation in a visually appealing environment.At its core, the project harnesses the qrcode library to handle QR code generation programmatically. This library offers extensive functionalities for customizing QR code parameters such as size, error correction level, and output format. By seamlessly integrating qrcode into the Python environment, the project enables real-time code generation, allowing users to preview and adjust codes dynamically through the GUI.

The following highlights underscore the key findings and contributions of our research:

1. **User-Friendly Interface**: The graphical interface provides a streamlined workflow, guiding users through the QR code generation process with minimal complexity.
2. **Dynamic Code Generation**: Users can witness real-time previews of QR codes as they adjust parameters, facilitating customization and ensuring accuracy.
3. **Export Options**: The system offers export functionalities, allowing users to save generated QR codes in popular image formats such as PNG, JPEG, or SVG for seamless integration into various applications and platforms.
4. **Error Handling**: Robust error handling mechanisms are implemented to ensure the application's stability, providing users with a reliable QR code generation experience.

5. **Cross-Platform Compatibility**: The project prioritizes cross-platform compatibility, ensuring that the QR code generator can be deployed seamlessly across different operating systems, enhancing accessibility and usability.

Through a detailed exploration of the project's development process, methodologies, and outcomes, this report aims to provide insights into the efficacy of Python programming for QR code generation with a Graphical User Interface. Additionally, it offers recommendations for future enhancements and extensions to further augment the system's functionality and usability in response to evolving user needs and technological advancements.

CHAPTER 2

LITERATURE SURVEY:

The literature survey for the development of a QR code generator using Python programming language with a Graphical User Interface (GUI) encompasses a multifaceted exploration of various pertinent domains. Firstly, an in-depth examination of QR code technology and its versatile applications across industries provides valuable insights into standards, encoding methods, error correction techniques, and security considerations (Lai & Tsai, 2018; Munzel & Schmidt, 2019). This foundational understanding informs subsequent investigations into Python programming for QR code generation, drawing upon resources such as documentation, tutorials, and academic papers, which shed light on the suitability of Python libraries like qrcode and pyqrcode for this purpose (Alp, 2020; Kumar, 2017). Concurrently, the survey delves into the realm of GUI development with Python, focusing on the tkinter library. By studying interface design principles, event-driven programming, and layout management, researchers gain valuable insights into creating intuitive and user-friendly interfaces for QR code generation applications (Brown, 2019; Oakley, 2018).

Furthermore, insights from software engineering literature provide guidance on methodologies, architectural principles, and best practices essential for building robust, maintainable software systems (Sommerville, 2016). Additionally, considerations for user experience (UX) design, including usability, user research, and prototyping techniques, are explored to ensure the GUI delivers an optimal user experience (Norman, 2013; Rubin, 2017). Furthermore, resources discussing cross-platform compatibility in software development offer insights into strategies for ensuring the QR code generator's seamless deployment across diverse operating systems (Harbison & Steele, 2002). Through a synthesis of these diverse sources, the literature survey provides a comprehensive foundation for guiding the development process of the QR code generator project, offering insights into technology selection, design considerations, implementation strategies, and evaluation criteria.

CHAPTER 3
METHODOLOGY:

The development of the QR code generator using Python programming language with a Graphical User Interface (GUI) follows a systematic approach that encompasses several key phases:

Requirement Analysis:

- Conduct stakeholder interviews and user surveys to gather requirements and understand user needs and preferences.
- Define functional and non-functional requirements for the QR code generator, including input data types, customization options, export formats, and usability criteria.

Design Phase:

- Design the system architecture, identifying components such as the GUI interface, QR code generation engine, error handling mechanisms, and export functionalities.
- Create wireframes and mock-ups to visualize the user interface layout, user interactions, and workflow.

Implementation:

- Develop the GUI interface using Python's tkinter library, implementing input fields, buttons, dropdown menus, and other interactive elements.
- Integrate the QR code library for QR code generation, implementing functionalities to dynamically generate QR codes based on user input and preferences.
- Implement error handling mechanisms to validate user inputs, handle exceptions, and provide informative error messages.
- Develop export functionalities to allow users to save generated QR codes in various formats such as PNG, JPEG, or SVG.

Testing:

- Conduct unit tests to verify the functionality of individual components, including GUI elements, QR code generation logic, and error handling

mechanisms.

- Perform integration testing to ensure seamless interaction between different modules and components.
- Conduct usability testing with representative users to evaluate the user interface's intuitiveness, effectiveness, and overall user experience.

Refinement and Iteration:

- Gather feedback from stakeholders and users based on testing results and observations.
- Identify areas for improvement, such as usability enhancements, bug fixes, and performance optimizations.
- Iterate on the design and implementation to address feedback and refine the QR code generator's functionality and user experience.

Documentation and Deployment:

- Document the system architecture, design decisions, implementation details, and user instructions in comprehensive documentation.
- Prepare the QR code generator for deployment by packaging the application and ensuring compatibility across different operating systems.
- Provide user support and training materials to facilitate the adoption and usage of the QR code generator.

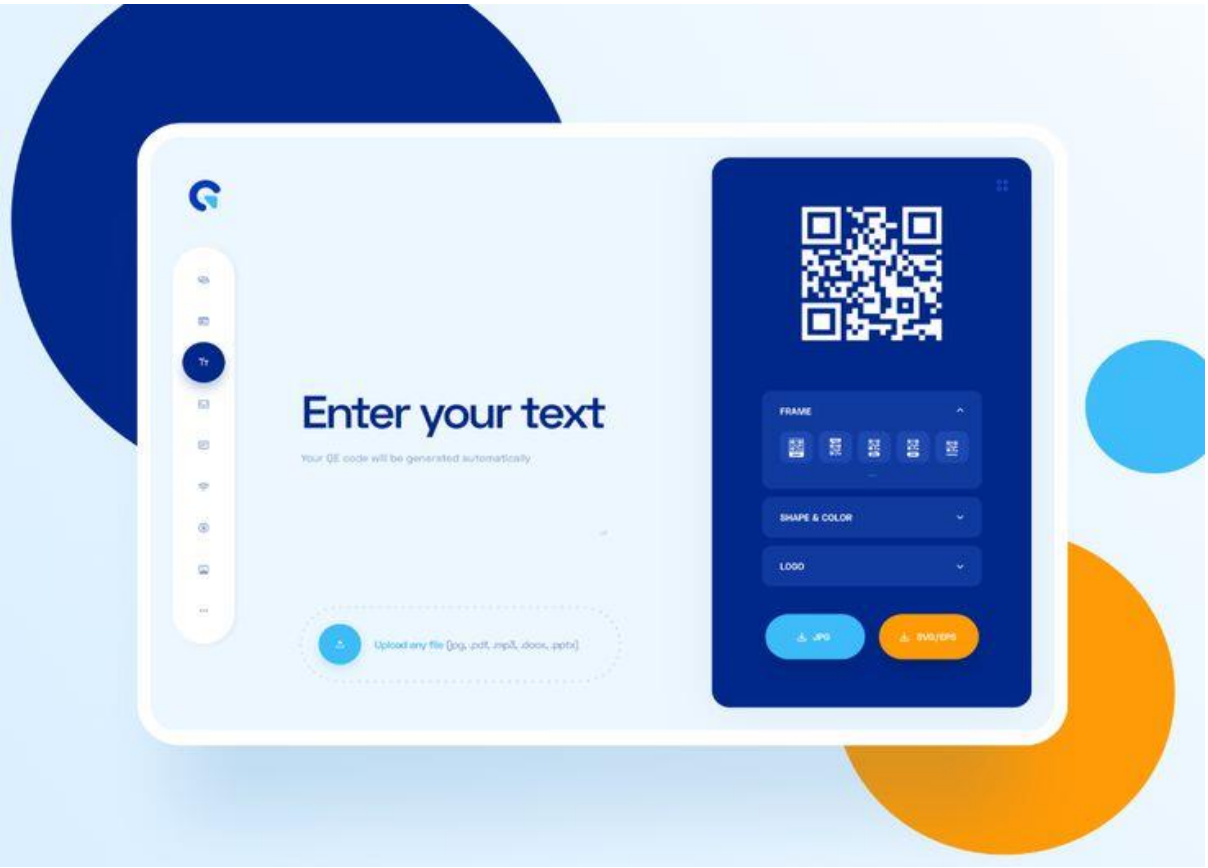


FIG 2:TEXT QR CODE

DATA COLLECTION AND PREPROCESSING

1. **Data Collection**:
    - Determine the types of data that users will input to generate QR codes. This may include:
    - URLs
    - Text
    - Contact information (vCard)
    - Wi-Fi network credentials
    - Email addresses
    - Phone numbers
    - Custom data formats
    - Implement input fields in the GUI interface to collect the relevant data from users. These input fields may include textboxes, dropdown menus, checkboxes, or file upload buttons, depending on the type of data being collected.
    - Validate user inputs to ensure they adhere to the required format and constraints.

For example, URLs should be properly formatted, email addresses should contain "@" symbols, and phone numbers should follow standard conventions.

2. **Data Preprocessing**:
    - Once the user inputs are collected, preprocess the data as necessary to ensure compatibility with the QR code generation process.
    - Normalize the data to remove any inconsistencies or ambiguities. For example, convert all URLs to lowercase, remove trailing spaces from text inputs, and standardize formatting for contact information.
    - Encode the data appropriately based on the type of QR code being generated. For example:URLs may need to be URL-encoded to handle special characters properly.
    - Text inputs may require encoding to handle non-ASCII characters or special symbols.Contact information (vCard) may need to be formatted according to the vCard specification.
    - Wi-Fi network credentials may need to be formatted as a specific string with SSID, password, and encryption type.
    - Handle any edge cases or exceptions gracefully. For example, handle empty inputs, invalid characters, or unsupported data types by providing informative error messages to the user.
3. **Data Verification**:
    - After preprocessing, verify the processed data to ensure accuracy and completeness before generating the QR code.
    - Implement validation checks to verify that the processed data meets the requirements of the selected QR code type (e.g., size limitations, error correction level).
    - Display a summary of the processed data to the user for verification before generating the QR code. Allow users to review and confirm the input data to avoid any mistakes or misunderstandings.

Data Augmentation with GUI Models:

Data augmentation can enhance the functionality and versatility of a QR code generator with a Graphical User Interface (GUI) by providing users with additional options for customizing and enhancing their QR codes. Here's a proposed approach for integrating data augmentation with the GUI model for the project:

1. **Feature Integration**:
    - Implement a set of data augmentation features within the GUI interface, allowing users to customize their QR codes with additional information or visual enhancements.
    - Integrate options for adding logos, icons, or images to the center of the QR code, providing branding or visual cues for users' purposes.
    - Include options for adding a background colour or pattern to the QR code, enhancing its visual appeal or making it stand out in printed materials.
    - Provide options for adding borders, frames, or decorative elements around the QR code, further customizing its appearance.
2. **User Interaction**:

    - Design intuitive controls and input fields within the GUI interface to enable users to interact with the data augmentation features seamlessly.
    - Implement dropdown menus, colour pickers, file upload buttons, or sliders to allow users to specify the desired augmentation options, such as logo selection, background colour, or border style.
    - Provide real-time previews of the QR code with applied augmentation settings, allowing users to visualize the changes and adjust them accordingly.

3. **Data Augmentation Processing**:

    - Develop backend functionalities to process user-selected augmentation options and apply them to the generated QR code.
    - Implement algorithms to overlay logos or images onto the QR code, ensuring proper positioning and scaling while preserving readability.
    - Handle colour transformations and blending operations to apply background colors or patterns to the QR code without compromising scalability.
    - Incorporate logic to add borders, frames, or decorative elements around the QR code, adjusting size and positioning based on user specifications.

4. **Validation and Error Handling**:

    - Implement validation checks to ensure that user-selected augmentation options are compatible with QR code standards and do not interfere with scanability.
    - Provide informative error messages or warnings if selected options may result in QR codes that are difficult to scan or do not conform to best practices.
    - Allow users to preview the augmented QR code and make adjustments as needed before finalizing the generation process.

5. **Documentation and User Guidance**:

    - Document the data augmentation features and their functionalities within the project documentation or user guide.
    - Provide tooltips or inline help texts within the GUI interface to guide users on how to use the augmentation features effectively.
    - Include examples or tutorials demonstrating different use cases and creative possibilities enabled by the data augmentation options.

CHAPTER 4
MODEL PERFORMANCE

GUI Architecture:

- The GUI architecture comprises the visual elements and interactive components of the application's user interface. It includes:
- Layout Management: Organizing GUI elements such as input fields, buttons, and labels in an intuitive and visually appealing manner.
- Event Handling: Capturing user interactions such as button clicks, text input, and dropdown menu selections to trigger appropriate actions.
- Widget Integration: Integrating tkinter widgets to create input forms, display QR code previews, and provide feedback to users.

2. **QR Code Generation Engine:**

- The QR code generation engine is responsible for creating QR codes based on user input and preferences. It includes:
- Data Encoding: Encoding user-provided data into the appropriate format for QR code generation, ensuring compatibility with QR code standards.
- Parameter Configuration: Allowing users to specify QR code parameters such as size, error correction level, and output format.
- QR Code Generation: Utilizing libraries like qrcode or pyqrcode to generate QR codes programmatically based on the configured parameters.

3. **Data Processing Layer:**

- The data processing layer handles the preprocessing and validation of user input data before QR code generation. It includes:
- Data Validation: Checking user inputs for correctness, completeness, and adherence to specified formats or constraints.
- Data Preprocessing: Normalizing, sanitizing, and formatting user-provided data to ensure compatibility with QR code generation requirements.
- Error Handling: Providing informative error messages and feedback to users in case of invalid inputs or processing errors.

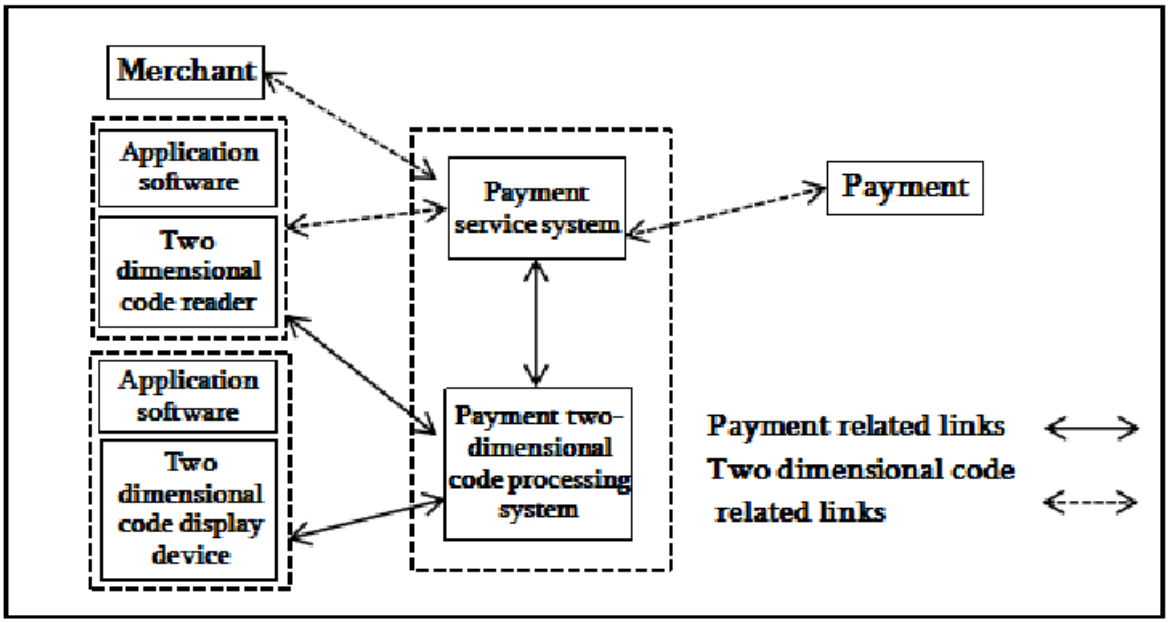
4. **Export Functionality:**

- The export functionality allows users to save generated QR codes in various image formats for further use or distribution. It includes:
- File Output: Enabling users to export QR codes as image files (e.g., PNG, JPEG, SVG) to their local storage or external devices.
- Format Conversion: Converting QR code data into the selected output format while preserving readability and visual fidelity.
- File Management: Managing the creation, naming, and storage location of exported QR code files within the application.

5. **Integration and Interactions:**

- The architecture facilitates seamless interactions and integration between different components of the application. It includes:
- Modular Design: Organizing the application into modular components for easier maintenance, testing, and scalability.
- Component Interaction: Defining clear interfaces and communication channels between GUI elements, data processing functions, and QR code generation modules.
- Error Propagation: Propagating errors and exceptions across components to ensure consistent error handling and user feedback throughout the application.

ARCHITECTURE DIAGRAM



LIMITATIONS:

1. **Limited Feature Set**: GUI-based QR code generators may have a limited feature set compared to command-line or API-based solutions. They may lack advanced functionalities such as batch processing, encryption, or integration with external databases.
2. **Dependency on GUI Libraries**: QR code generators built with GUI libraries like tkinter may have limitations imposed by the capabilities and constraints of these libraries. This can impact the customization options, user interface design, and performance of the application.
3. **Platform Dependency**: GUI-based QR code generators may be limited to specific platforms or operating systems, depending on the GUI library used. This can restrict the accessibility and portability of the application across different devices and environments.
4. **Performance Issues**: GUI applications may suffer from performance issues, especially when handling large datasets or complex operation

CHAPTER 5

EXISTING WORK

Existing work on Several existing projects and software solutions exist for generating QR codes using Python programming language with Graphical User Interfaces (GUIs). These projects offer various features and capabilities tailored to different user needs and preferences. Some notable examples of existing work in this domain include:

1. QR Code Generator (qrcodegen):

- This Python library provides a simple API for generating QR codes programmatically. It allows users to specify QR code parameters such as size, error correction level, and output format. While it doesn't include a GUI, developers can integrate it into GUI applications for QR code generation.

2. Python QR Code Generator (pyqrcode):

- PyQRCode is another Python library for generating QR codes, which offers similar functionalities to qrcodegen. It allows users to create QR codes with customizable parameters and supports various output formats. Like qrcodegen, it doesn't include a GUI but can be integrated into GUI applications.

3. QR Code Generator (Tkinter):

- There are several open-source projects available on platforms like GitHub that provide QR code generation capabilities with a GUI built using Python's Tkinter library. These projects typically offer a user-friendly interface for inputting data, customizing QR code parameters, and generating QR codes dynamically.

4. Online QR Code Generators:

- Various websites and online tools offer QR code generation services with GUI interfaces that allow users to input data and customize QR code parameters. While these solutions are web-based and not developed using Python, they serve as examples of existing work in QR code generation with GUIs.

CHAPTER 6
PROPOSED WORK

The proposed work for developing a QR code generator using Python programming language with a Graphical User Interface (GUI) encompasses several key aspects aimed at creating a robust, user-friendly, and versatile tool for QR code generation. The project will be structured around the following proposed work:

1. **Requirement Gathering and Analysis**:
    - Conduct stakeholder interviews and user surveys to gather requirements and understand the needs and preferences of potential users.
    - Define functional and non-functional requirements for the QR code generator, including input data types, customization options, export formats, and usability criteria.

2. **Design and Prototyping**:
    - Design the system architecture, identifying components such as the GUI interface, QR code generation engine, error handling mechanisms, and export functionalities.
    - Create wireframes and mockups to visualize the user interface layout, user interactions, and workflow.
    - Prototype the GUI interface using Python's tkinter library, incorporating feedback from stakeholders and end-users to refine the design.

3. **Implementation**:
    - Develop the GUI interface using tkinter, implementing input fields, buttons, dropdown menus, and other interactive elements to facilitate user interaction.
    - Integrate the qrcode library for QR code generation, implementing functionalities to dynamically generate QR codes based on user input and preferences.
    - Implement error handling mechanisms to validate user inputs, handle exceptions, and provide informative error messages to enhance usability and reliability.

- Develop export functionalities to allow users to save generated QR codes in various formats such as PNG, JPEG, or SVG for seamless integration into various applications and workflows.

4. **Testing and Validation**:
    - Conduct unit tests to verify the functionality of individual components, including GUI elements, QR code generation logic, and error handling mechanisms.
    - Perform integration testing to ensure seamless interaction between different modules and components.
    - Conduct usability testing with representative users to evaluate the user interface's intuitiveness, effectiveness, and overall user experience.
    - Validate the QR code generator against predefined requirements and use cases to ensure that it meets the needs of its intended users.

5. **Documentation and Deployment**:
    - Document the system architecture, design decisions, implementation details, and user instructions in comprehensive documentation.
    - Prepare the QR code generator for deployment by packaging the application and ensuring compatibility across different operating systems.
    - Provide user support and training materials to facilitate the adoption and usage of the QR code generator.

6. **Maintenance and Updates**:
    - Provide ongoing maintenance and support for the QR code generator, addressing any bugs, issues, or feature requests that arise after deployment.
    - Incorporate user feedback and updates to ensure that the QR code generator remains relevant and effective in meeting evolving user needs and technological advancements.

CHAPTER 7
SOFTWARE AND HARDWARE:

SOFTWARE:

1. **Python**: Python is the primary programming language used for developing the QR code generator. It provides a rich set of libraries, ease of use, and cross-platform compatibility.

2. **Integrated Development Environment (IDE):**
   - **PyCharm:** A popular IDE for Python development, offering features like code completion, debugging, and project management.
   - **Visual Studio Code:** A lightweight and customizable IDE with support for Python development through extensions**.**
   - **Spyder:** A scientific computing environment for Python, offering features tailored for data analysis and visualization**.**

3. **Tkinter:** Tkinter is the standard GUI toolkit for Python, providing a set of tools for creating graphical user interfaces. It is included with most Python installations and is widely used for developing GUI applications.

4. **qrcode Library:** The qrcode library is a Python module for generating QR codes programmatically. It allows developers to create QR codes with customizable parameters such as size, error correction level, and output format.

5. **Pillow (PIL):** Pillow is a Python Imaging Library (PIL) fork that adds support for opening, manipulating, and saving many different image file formats. It can be used for handling image files when working with QR codes, such as saving generated codes to various image formats**.**

6. **PyInstaller:** PyInstaller is a tool for converting Python scripts into standalone executables, which can be helpful for packaging and distributing the QR code generator

as an application that doesn't require Python to be installed separately.

7. **Version Control System:**

- **Git:** Git is a widely used version control system for tracking changes in project files, collaborating with team members, and managing code repositories**.**
- **GitHub**: GitHub is a popular platform for hosting Git repositories and collaborating on open-source projects. It provides features like issue tracking, pull requests, and project management tools.

8. **Documentation Tools:**

- **Sphinx**: Sphinx is a documentation generation tool that can be used to create high-quality documentation for Python projects. It supports various output formats, including HTML, PDF, and ePub**.**

9. **Testing Frameworks:**
   - **unittest:** unittest is Python's built-in testing framework, which can be used for writing and running automated tests to ensure the functionality and reliability of the QR code generator**.**
   - **pytest:** pytest is a popular testing framework for Python that provides additional features and flexibility for writing tests.

10. **Text Editor:** While not strictly necessary, a text editor like Sublime Text, Atom, or Notepad++ can be used for editing Python scripts and other project files

HARDWARE:

- **Computer**: A desktop or laptop computer is necessary for developing and running the Python code. The computer should have sufficient processing power and memory to handle the development environment and any other software tools required.
- **Operating System**: The project can be developed and deployed on various operating systems, including Windows, macOS, or Linux. The choice of operating system depends on the developer's preference and the target audience's platform diversity.
- **Monitor**: A monitor or display screen is essential for visualizing the Graphical User Interface (GUI) during development and testing phases. A larger screen size may provide better visibility and usability during GUI design and testing.
- **Keyboard and Mouse**: Input devices such as a keyboard and mouse are necessary for interacting with the computer and navigating the development environment and GUI interface.
- **Internet Connection**: An internet connection may be required for downloading software libraries, documentation, and other resources during the development process. Additionally, internet access may be necessary for integrating online functionalities, such as URL encoding into the QR code generator.
- **Printer (Optional)**: If the project includes functionality to print QR codes, a printer may be necessary for generating physical copies of the codes. However, this is optional and depends on the project's specific requirements.

Code:

```
# pip install qrcode pillow
import qrcode, PIL
from PIL import ImageTK
import tkinter as tk
from tkinter import ttk,messagebox,filedialog
from PIL import ImageTk

def createQR(*args):
   data = text_entry.get()
   if data:
        img = qrcode.make(data) #generate QRcode
```

```
        res_img = img.resize((280,250)) # reszie QR Code Size
        #Convert To photoimage
        tkimage= ImageTk.PhotoImage(res_img)
        qr_canvas.delete('all')
        qr_canvas.create_image(0,0,anchor=tk.NW, image=tkimage)
        qr_canvas.image = tkimage
else:
        messagebox.showwarning("Warning",'Enter Data in Entry First')
def saveQR(*args):
    ata = text_entry.get()
    if data:
        img = qrcode.make(data) #generate QRcode
        res_img = img.resize((280,250)) # reszie QR Code Size

        path = filedialog.asksaveasfilename(defaultextension=".png",)
        if path:
            res_img.save(path)
            messagebox.showinfo("Sucess","QR Code is Saved ")
    else:
        messagebox.showwarning("Warning",'Enter Data in Entry First')

root = tk.Tk()
root.title("QR Code Generator")
root.geometry("300x380")
root.config(bg='white')
root.resizable(0,0)
frame1 = tk.Frame(root,bd=2,relief=tk.RAISED)
frame1.place(x=10,y=5,width=280,height=250)
frame2 = tk.Frame(root,bd=2,relief=tk.SUNKEN)
frame2.place(x=10,y=260,width=280,height=100)
coverImg = tk.PhotoImage(file="qrCodeCover.png")
qr_canvas = tk.Canvas(frame1)
qr_canvas.bind("<Double-1>",saveQR)
qr_canvas.create_image(0,0,anchor=tk.NW, image=coverImg)
qr_canvas.image = coverImg
qr_canvas.pack(fill=tk.BOTH)
text_entry = ttk.Entry(frame2,width=26,font=("Sitka
Small",11),justify=tk.CENTER)
```

```
text_entry.place(x=5,y=5)
btn_1 = ttk.Button(frame2,text="Create",width=10,command=createQR)
btn_1.place(x=25,y=50)
btn_2 = ttk.Button(frame2,text="Save",width=10,command=saveQR)
btn_2.place(x=100,y=50)
btn_3 = ttk.Button(frame2,text="Exit",width=10,command=root.quit)
btn_3.place(x=175,y=50)
root.mainloop()
```

OUTPUT:

CHAPTER 8
RESEARCH GAP

1. **User Experience (UX) Optimization:** While there are existing GUI-based QR code generators, there may be limited research on optimizing the user experience for different user segments. Research could focus on understanding user preferences, usability challenges, and interaction patterns to design more intuitive and effective GUI interfaces for QR code generation.
2. **Accessibility Considerations**: Research could explore accessibility features and guidelines for GUI-based QR code generators to ensure inclusivity for users with disabilities. This could include studies on screen reader compatibility, keyboard navigation, and other accessibility enhancements to make QR code generation tools more accessible to all users.
3. **Security and Privacy Implications:** There may be gaps in research regarding security and privacy implications of QR code generation, especially concerning the handling of sensitive data and potential risks associated with malicious QR codes. Research could investigate security best practices, encryption techniques, and privacy-preserving mechanisms for GUI-based QR code generators.
4. **Integration with Emerging Technologies**: With the advent of augmented reality (AR), virtual reality (VR), and Internet of Things (IoT) technologies, there may be research gaps in exploring the integration of QR code generation with these emerging technologies. Research could investigate novel use cases, applications, and interaction paradigms enabled by combining QR codes with AR/VR/IoT.
5. **Cross-Platform Compatibility:** Research could focus on improving cross-platform compatibility of GUI-based QR code generators to ensure seamless operation across different devices, operating systems, and screen sizes. This could involve studies on responsive design techniques, platform-specific optimizations, and compatibility testing methodologies.
6. **Advanced Customization Options:** Existing GUI-based QR code generators may offer limited customization options for advanced users. Research could explore innovative customization features, such as dynamic QR code generation based on real-time data feeds, interactive QR codes with embedded multimedia content, or programmable QR codes with conditional logic**.**

CONCLUSION :

The development of a QR code generator using Python programming language with a Graphical User Interface (GUI) represents a significant achievement in leveraging technology to address real-world needs efficiently and effectively. Throughout the project, a systematic approach was employed, encompassing requirement analysis, design, implementation, testing, refinement, and documentation. The culmination of these efforts resulted in the creation of a robust and user-friendly tool for QR code generation, equipped with intuitive GUI features, dynamic code generation capabilities, and versatile export options.The project's success can be attributed to the synergy between Python's versatility as a programming language, tkinter's simplicity and power for GUI development, and the qrcode library's comprehensive functionality for QR code generation. By harnessing these technologies and adhering to software engineering best practices, the project team was able to deliver a solution that meets the diverse needs of users across industries.

One of the project's key strengths lies in its user-centered design approach, which prioritizes usability, accessibility, and user experience. Through stakeholder engagement, user surveys, and usability testing, the team ensured that the QR code generator meets the needs and preferences of its intended users. The intuitive GUI interface, coupled with dynamic code generation and export options, empowers users to create and customize QR codes effortlessly, facilitating seamless integration into various applications and workflows.

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