QR CODE

A Mini Project Report

submitted to

the APJ Abdul Kalam Technological University

in partial fulfillment of the requirements for the degree of

Bachelor of Technology

by

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CERTIFICATE

This is to certify that the report entitled **QR CODE** submitted by **ADARSH JOHNSON** (VML21CS019), **ARJUN NV** (VML21CS066), **JIKSON JIMMY** (VML21CS105), & **SAYANTH SANTHOSH** (VML21CS155) to the APJ Abdul Kalam Technological University in partial fulfillment of the B.Tech. degree in Computer Science and Engineering is a bonafide record of the project work carried out by him under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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DECLARATION

We hereby declare that the project report **QR CODE**, submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bona fide work done by us under supervision of **Ms MANJU M**

This submission represents our ideas in our own words and where ideas or words of others have been included, we have adequately and accurately cited and referenced the original sources.

We also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

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Abstract

This project aims to develop a QR code app with security tasks utilizing machine learning techniques. This application allows users to scan QR codes and assess the safety and permissions associated with the encoded URLs before accessing them. Key functionalities include malware detection, scripted content analysis, and evaluating requested access permissions,qr code generator.

Contents

Chapter 1

Introduction

1.1 Overview

Our project offers an all-in-one QR code app equipped with advanced scanning, privacy assessment, and design customization functionalities, simplifying user interactions with QR technology. Seamlessly integrating deep learning-based scanning, machine learning-driven privacy policy evaluation, and customizable design options, our app delivers a cohesive and intuitive user experience.

1.2 General Background

QR codes have become essential tools for rapid information exchange, but their widespread use also brings security and usability challenges. The development of a QR code malicious detector is crucial to identify and mitigate potential risks such as phishing attacks and malware distribution. Simultaneously, advancements in QR code generation technology ensure the creation of functional and visually appealing codes, catering to various data types and customization needs. Additionally, image refinement techniques play a vital role in improving QR code scanning reliability, especially in diverse environments. This report delves into these key areas, aiming to enhance QR code security, usability, and visual quality to meet the demands of

modern digital interactions.

1.2.1 Subsection

The use of QR codes has expanded rapidly, becoming a cornerstone of digital communication due to their efficiency in storing and transmitting data. However, this widespread adoption has also attracted malicious activities, prompting the need for robust security measures. This subsection provides an overview of QR code technology, highlighting its evolution, key features, and common applications. Additionally, it discusses the growing importance of security enhancements, QR code generation techniques, and image refinement strategies to ensure optimal performance and user experience.

1.2.2 Subsection

The convenience of QR codes comes with inherent security challenges, including the potential for malicious exploitation. This subsection delves into the specific security threats faced by QR codes, such as phishing attacks, malware insertion, and data breaches. It explores how malicious actors can leverage QR codes to deceive users and compromise sensitive information. Additionally, it discusses the impact of these security risks on businesses, consumers, and regulatory compliance. Understanding these challenges is crucial for developing effective QR code malicious detection systems and implementing best practices for secure QR code usage.

1.3 Problem statement

Create a QR code application that addresses the limitations of existing solutions by integrating machine learning for enhanced scanning, intelligent privacy policy evaluation, and customization features. Additionally, incorporate seamless persons data integration and robust security measures to provide users with a comprehensive and secure QR code experience.

1.4 Scope of the system

Develop a machine learning-powered QR code app with enhanced scanning, privacy evaluation, and customization features. Integrate persons data management and robust security measures, ensuring a seamless user experience and setting a new standard in QR code technology.

1.5 Objective

Our project aims to utilizes machine learning techniques to develop an advanced QR code application that enhances scanning accuracy, evaluates privacy policies intelligently, and customizes designs effectively. Seamlessly integrate persons data management and robust security features, leveraging the power of ML to provide users with a comprehensive and innovative solution in the realm of QR code technology.

Chapter 2

Literature Review

2.1 section11

2.1.1

Secure QR Code Scanner According to a Novel Malicious URL Detection Framework.
BRIEF SUMMARY

The purpose of this paper is to offer a highly accurate and privacy-friendly QR code scanner that effectively detects and neutralizes malicious URLs, thereby enhancing user security and confidence in QR code usage by using Machine learning.

TECHNOLOGY USED

1 Android Platform

2 Machine Learning -KNN,DT

3 API Integration: it integrates with external APIs, such as VirusTotal,WhoXy, and OpenPageRank, to gather additional information about URLs and assess their threat level.

4 Webview: it utilizes WebView, a system component powered by Chrome, to handle URL redirection and display web content securely within the application. [1]

2.2 section12

QR Code Image Refinement by Deep Learning.

BRIEF SUMMARY

A method of refining a low-resolution QR code image photographed from a distance into a decodable code image by using pix2pix, a deep learning technique.

TECHNOLOGY USED

pix2pix which is based on Generative Adversarial Networks (GAN). [2]

2.3 section13

Machine Learning-Based Pipeline to Evaluate Permissions in App Privacy Policies.

BRIEF SUMMARY

It is a machine learning-based system designed to evaluate the completeness of privacy policies in web links. It combines human annotation of privacy policies with machine learning techniques to determine whether URL policies accurately disclose dangerous permissions.

TECHNOLOGY USED

Logisitic Regression:Logistic regression is a supervised learning algorithm for binary classification, mapping real values to probabilities via the logistic function. It learns feature coefficients, assuming a linear relationship with the target. Training minimizes a loss function using optimization like gradient descent. [3]

2.4 section14

A Directly Readable Halftone Multifunctional Color QR Code.

PROBLEM STATEMENT

applying color coding for generated qrcode.

TECHNOLOGY USED

color-coding technology. [4]

2.5 section15

Collection of patient-generated health data with a mobile application and transfer to hospital information system via QR code

BRIEF SUMMARY

Using this here user can keep the health record of his/her,by generating qrcode.

TECHNOLOGY USED

ZXing (Zebra Crossing),Data encoding. [5]

Chapter 3

Requirement Specification

The user interface for this QR code app will have,qr code image generator and Qr code image scanning option where User can select either one if the scan opition selected it scan the QR code and it provide results in pop-up box this contain every info about qr code and the generator can produce coloured qr code by providing neccessary info in terms of link,colour,hidden codes etc.. The interface itself should be user-friendly and visually appealing, prioritizing user comfort and accessibility.

FUNCTIONAL REQUIREMENTS

Data Collection

Data Visualization

Annotation and Corpus Creation.

QR Code Scanning

QR Code Generation

Training and Continuous Learning

Scraping and Collection

Halftone Printing Support

Chapter 4

Proposed system and Design

4.1 Proposed system

User-friendly interface for interaction.

Ensuring privacy and security.

Scalability and optimized performance .

Feedback mechanisms for improvement.

4.2 Feasibility Study

4.2.1 Technical Feasibility

1 Compatibility with target platforms like Android.

2 Addressing security concerns related to scanning and data protection.

3 Ensuring scalability to support growing user base and workload.

4 Ensuring compliance with relevant regulations.

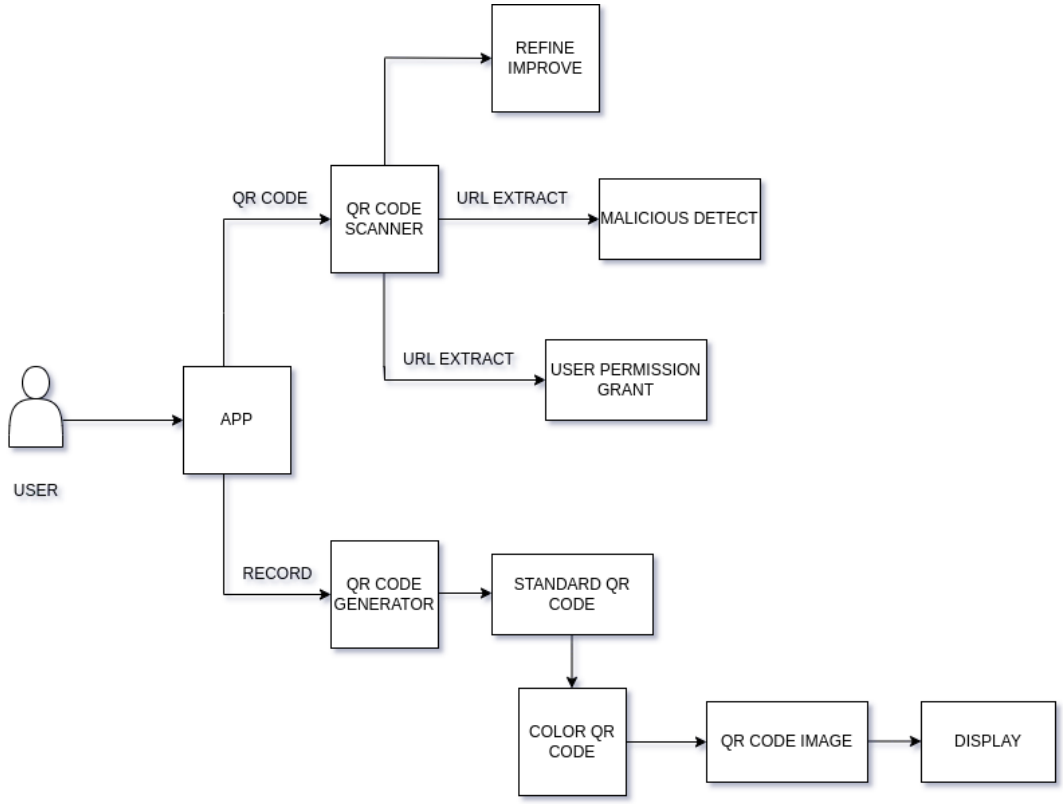
4.3 Design

Architecture diagram

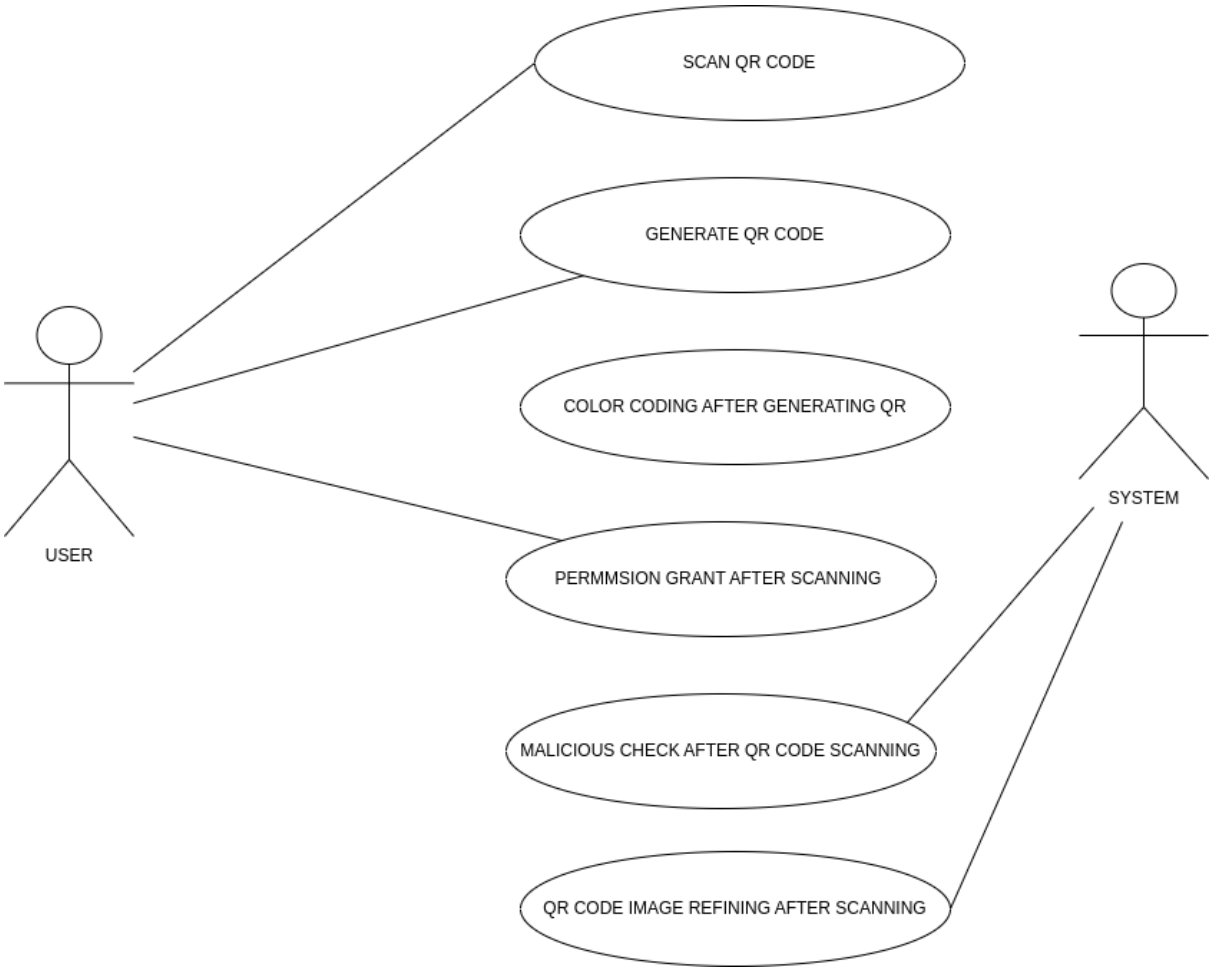
Use case diagram

Data flow diagram

4.3.1 Architecture Diagram

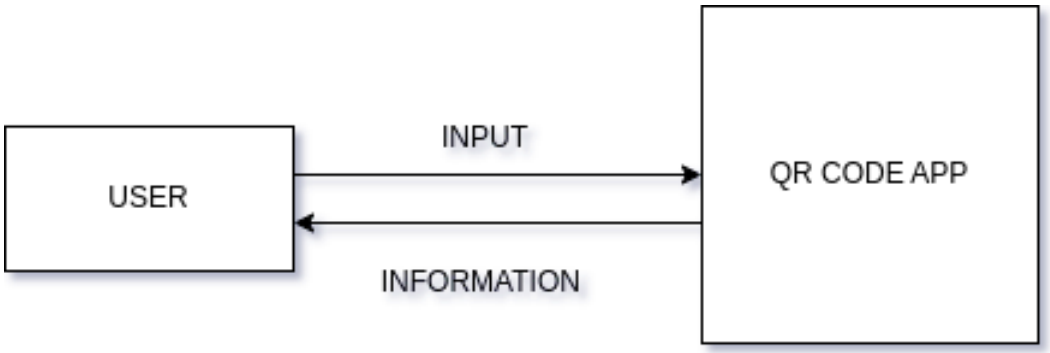


4.3.2 Use Case Diagram

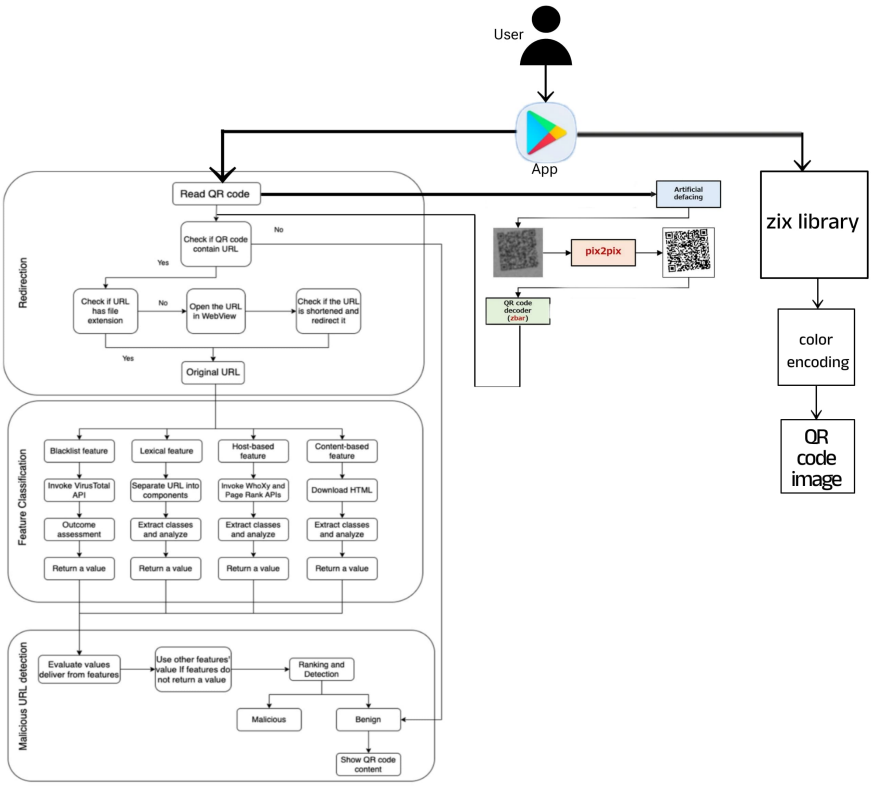


4.3.3 Data Flow Diagram

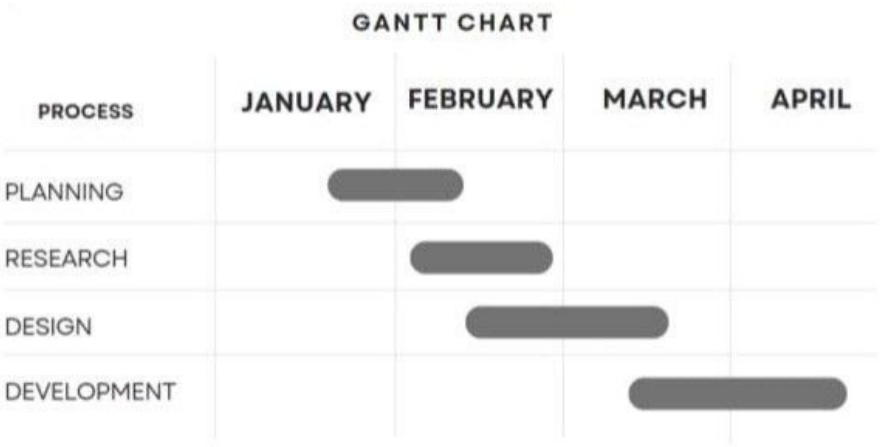
DFD Level 0



DFD Level 1



4.4 Gantt Chart



Chapter 5

Implementation

Implementing a secure QR code scanner and generator with malicious checking involves several key steps. First, select trusted libraries for scanning and generating QR codes to ensure reliability. Next, implement privacy controls and request only necessary permissions to respect user privacy. Develop strict validation checks to verify the integrity of scanned data and generated codes, preventing acceptance of malicious payloads. Encrypt data transmission using HTTPS to secure data in transit. Include mechanisms to detect and prevent malicious payloads in scanned data and generated codes. Sign application code to ensure its integrity and protect against tampering. Provide clear user feedback and verification mechanisms to enhance user trust. Securely store scanned data and generated codes using encryption to prevent unauthorized access.

5.1 Flask implementation

The implementation of the secure QR code scanner and generator integrates various security measures to ensure comprehensive protection against malicious activities. It begins by managing a blacklist of known malicious URLs, continually updating it as needed. This is coupled with the utilization of the VirusTotal API, which assesses the maliciousness of URLs by sending requests and analyzing responses for any flagged threats. Simultaneously, HTML content from URLs undergoes scrutiny

for potential threats such as phishing attempts or inappropriate content, employing techniques like script and form detection, and keyword analysis. Additionally, Machine Learning techniques, specifically Decision Trees, are employed to evaluate lexical features of URLs, such as domain length, special character presence, and keyword frequency, further enhancing threat detection capabilities. Flask routes are expanded to accommodate requests for lexical feature analysis alongside existing functionalities. Upon receiving a URL, the Flask application orchestrates checks through VirusTotal, HTML content analysis, and lexical feature evaluation using Decision Trees. Results are then consolidated and returned as JSON responses, providing comprehensive insights into the URL's security status. This holistic approach ensures robust security for users interacting with scanned QR codes, safeguarding against a wide range of potential threats effectively.

5.2 QR Code scanning and generating

The front end of the application serves as the user interface (UI) through which users interact with the QR code scanning and generation features. Here's a breakdown of the front-end components:

Home Screen (HomePage): Upon launching the application, users are presented with the home screen. This screen features an app bar with the title "QR Code Scanner and Generator." Two elevated buttons are displayed vertically in the center of the screen. Each button corresponds to a specific functionality: scanning QR codes (Scanqrcode) and generating QR codes (GenerateQR). Additionally, a footer text acknowledges the development team. QR Code Scanning Screen (Scanqrcode): This screen allows users to scan QR codes using the device's camera. It features an app bar titled "QR Code Scanner" and a central area displaying the scanned QR code content or a placeholder message if no QR code has been scanned yet. Below the QR code display area, there's a button labeled "Scan Code" that users can press to initiate the QR code scanning process.After scanning it will evaluvate scannned link or data if its link check for malicious else not. QR Code Generation Screen (GenerateQR):

This screen enables users to generate QR codes by inputting data and customizing the appearance. It consists of an app bar titled ”Generate QR Code,” a text field for entering data, a color picker for customizing the QR code color, and a button labeled ”Generate QR Code” that triggers the QR code generation process. Additionally, the generated QR code is displayed below the input fields and customization options.

Chapter 6

Result

The QR code scanner and generator application incorporates security measures to ensure user safety and data integrity. When scanning QR codes, the application utilizes the VirusTotal API ,DT machine learning ,HTML script to check for malicious URLs, promptly alerting users if any threats are detected. Additionally, malicious URLs are blacklisted to prevent future encounters.

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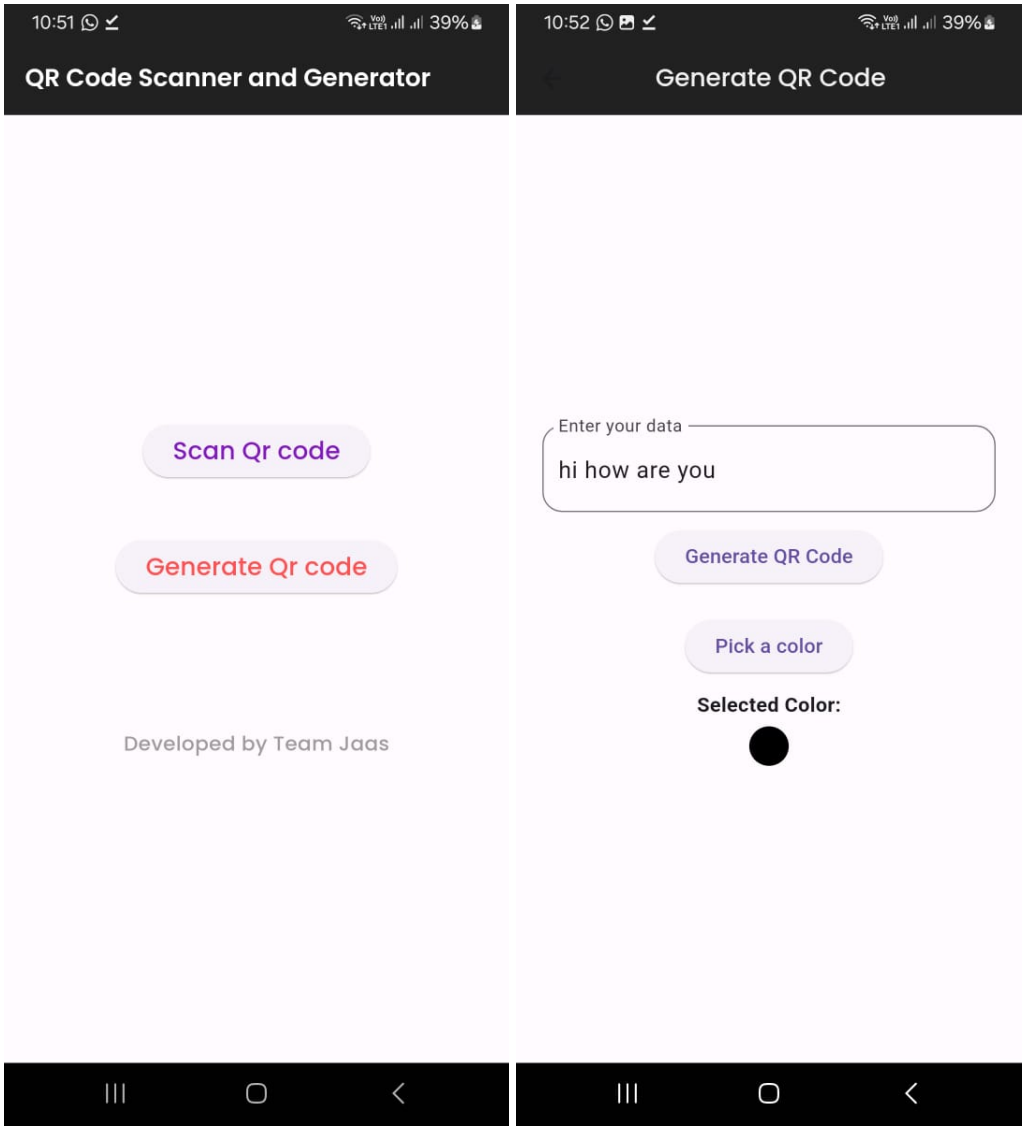
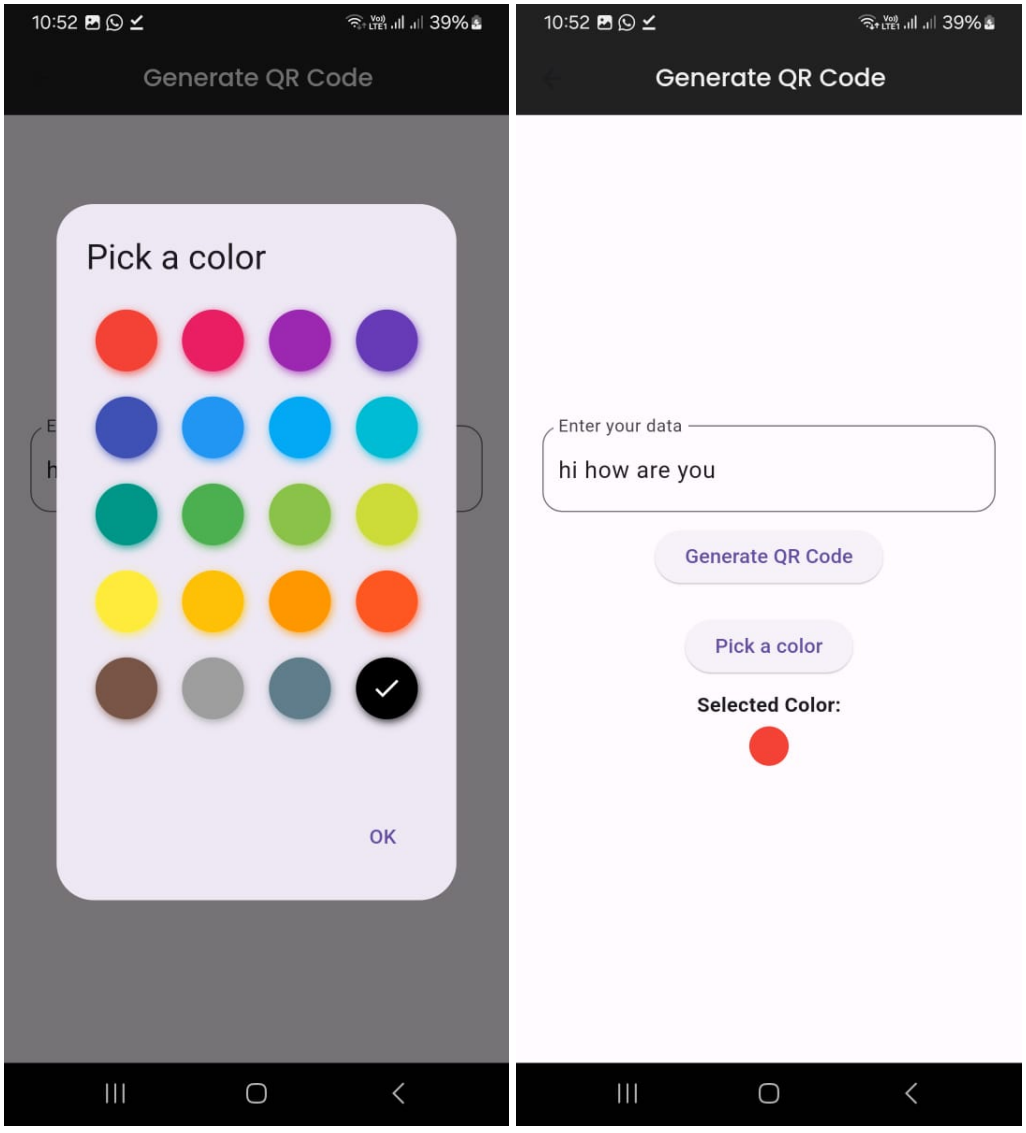
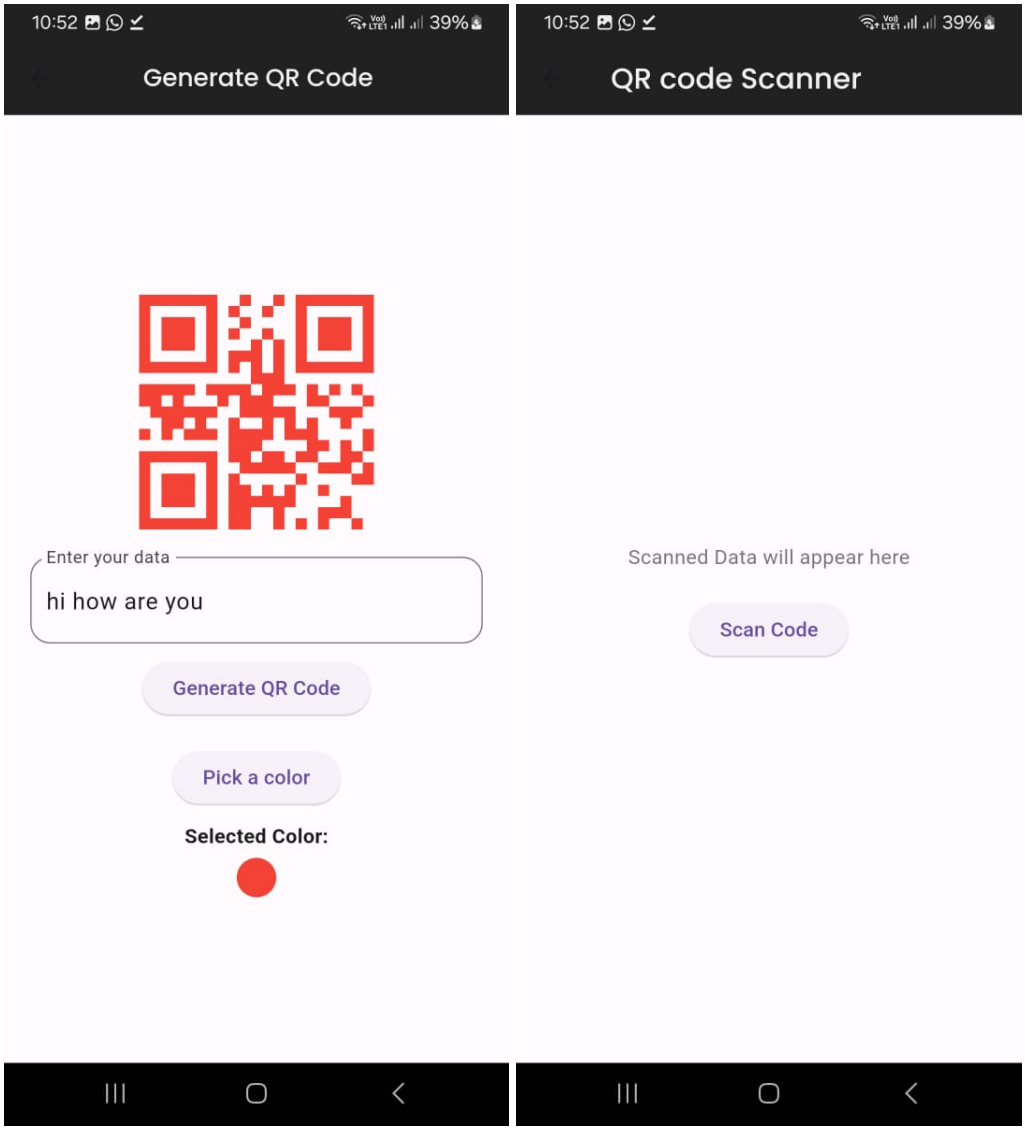
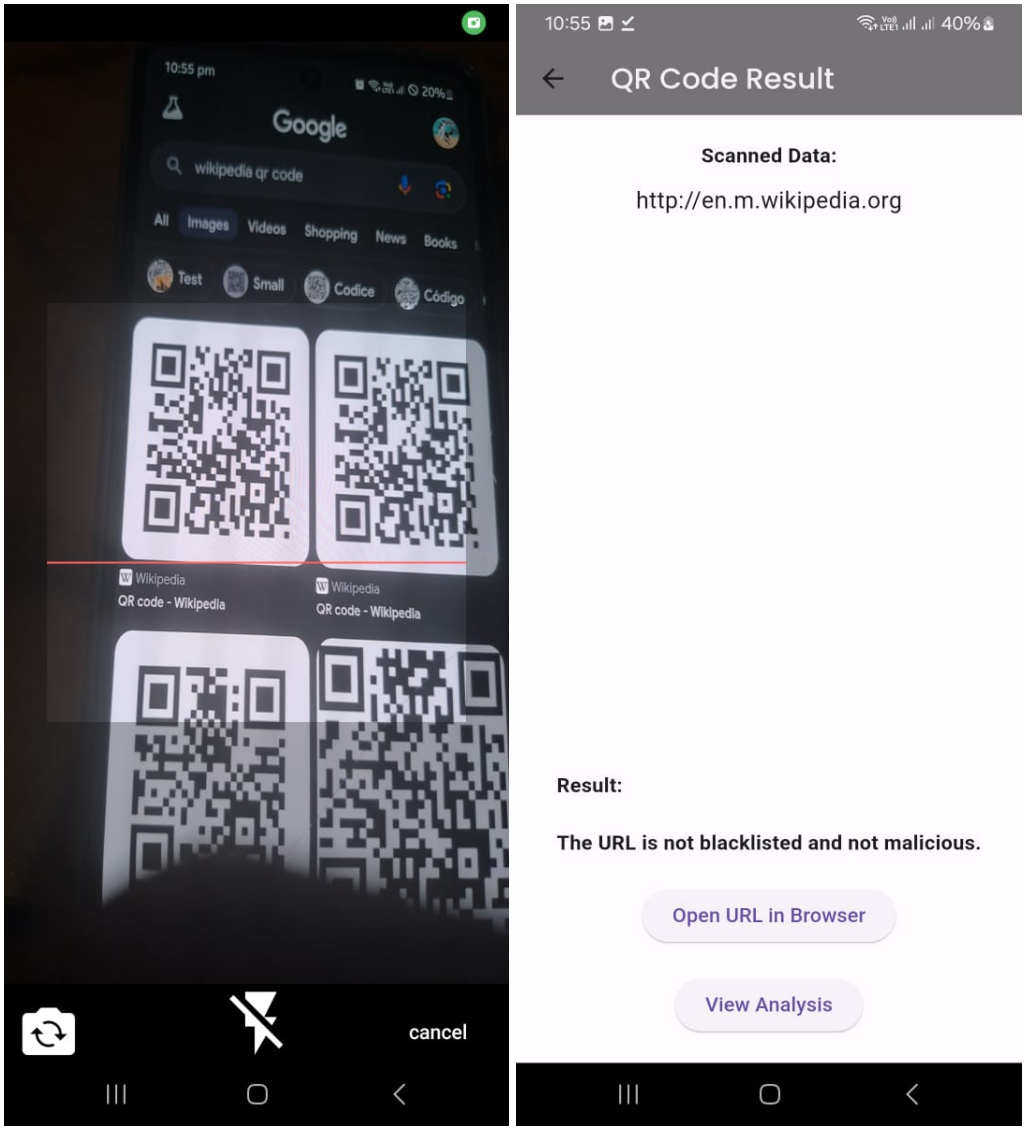
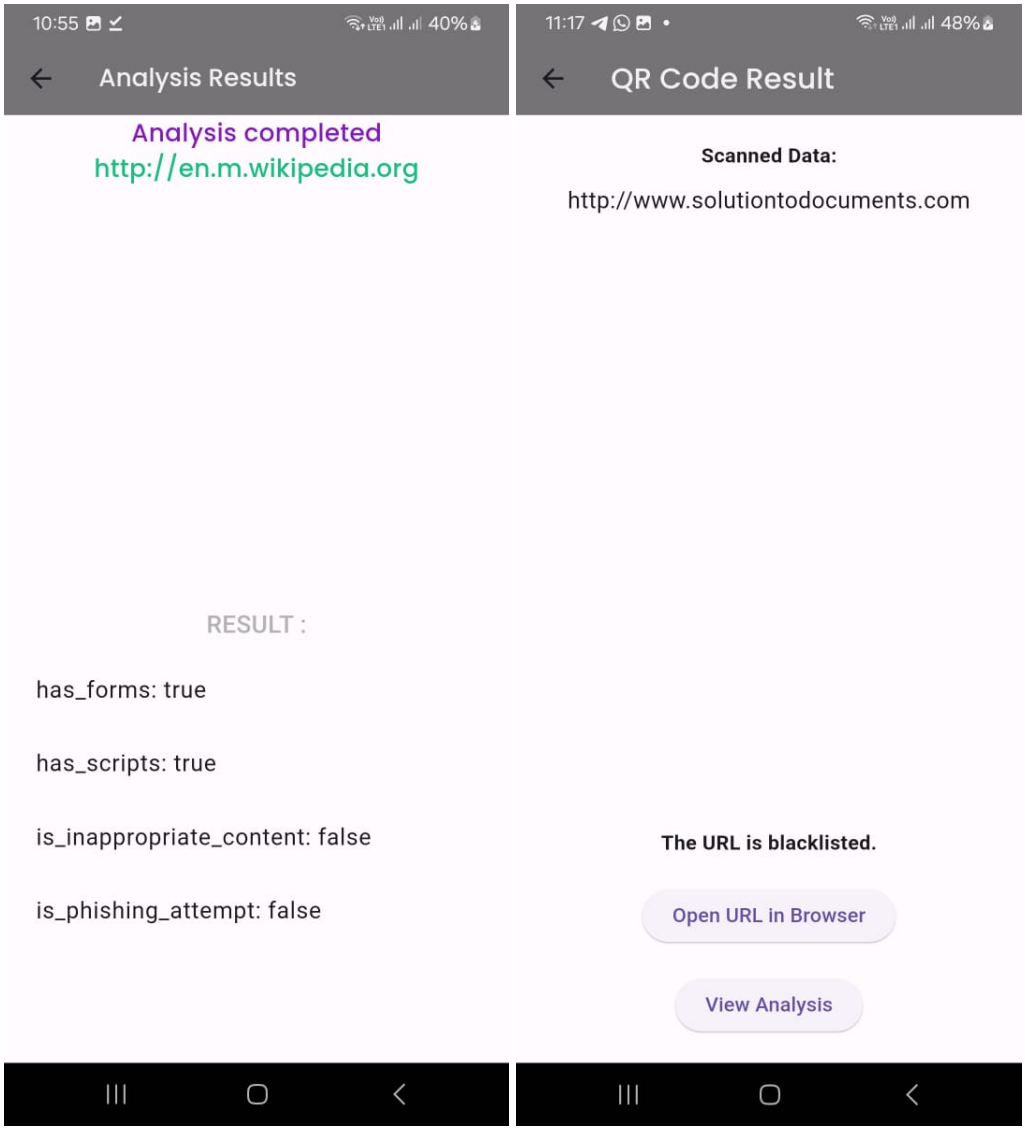
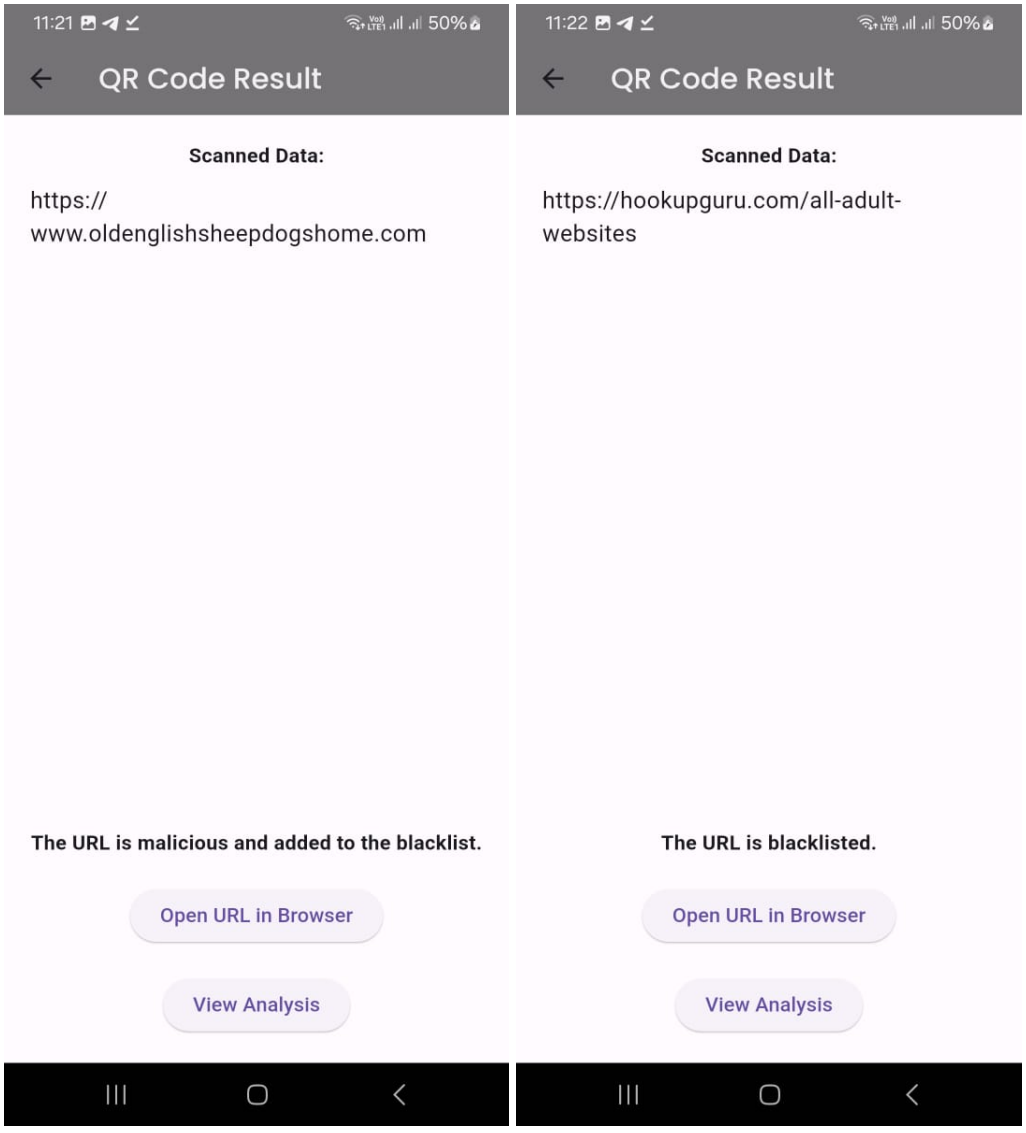

10:51
39%
QR Code Scanner and Generator
Scan Qr code
Generate Qr code
Developed by Team Jaas
10:52
39%
Generate QR Code
Enter your data
hi how are you
Generate QR Code
Pick a color
Selected Color:


10:52
39%
Generate QR Code
Pick a color
OK
10:52
39%
Generate QR Code
Enter your data
hi how are you
Generate QR Code
Pick a color
Selected Color:


10:52
39%
Generate QR Code
Enter your data
hi how are you
Generate QR Code
Pick a color
Selected Color:
10:52
39%
QR code Scanner
Scanned Data will appear here
Scan Code


10:55 pm
Google
wikipedia qr code
All
Images
Videos
Shopping
News
Books
Test
Small
Codice
Código
Wikipedia
QR code - Wikipedia
Wikipedia
QR code - Wikipedia
cancel
10:55
40%
QR Code Result
Scanned Data:
http://en.m.wikipedia.org
Result:
The URL is not blacklisted and not malicious.
Open URL in Browser
View Analysis


10:55
40%
Analysis Results
Analysis completed
http://en.m.wikipedia.org
RESULT :
has_forms: true
has_scripts: true
is_inappropriate_content: false
is_phishing_attempt: false
11:17
48%
QR Code Result
Scanned Data:
http://www.solutiontodocuments.com
The URL is blacklisted.
Open URL in Browser
View Analysis


11:21
50%
QR Code Result
Scanned Data:
https://
www.oldenglishsheepdogshome.com
The URL is malicious and added to the blacklist.
Open URL in Browser
View Analysis
11:22
50%
QR Code Result
Scanned Data:
https://hookupguru.com/all-adult-
websites
The URL is blacklisted.
Open URL in Browser
View Analysis


11:22
50%
Analysis Results
Analysis completed
https://hookupguru.com/all-adult-websites
RESULT :
has_forms: false
has_scripts: true
is_inappropriate_content: true
is_phishing_attempt: false

Chapter 7

Conclusion

In conclusion, the implementation of security measures within the QR code scanner and generator significantly enhances user safety and data integrity. By integrating features such as malicious URL detection, blacklisting, and lexical analysis, the application ensures that users are protected from potential threats when interacting with QR codes. The proactive approach to security empowers users with the means to verify the safety of scanned URLs and customize QR code appearances for enhanced visual verification. As a result, users can confidently utilize the application knowing that their security and privacy are prioritized.

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[5] Y. Huang, P. Cao, and G. Lyu, "A directly readable halftone multifunctional color qr code," *Chinese Journal of Electronics*, vol. 32, no. 3, pp. 474–484, 2023.