

RajaMark User Manual

Documentation

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1.0 Introduction

Meet RajaMark, your reliable helper to automate the grading of multiple-choice question (MCQ) answer sheets. By leveraging Tesseract OCR for handwritten text recognition and OpenCV for image preprocessing, RajaMark can swiftly and accurately interpret handwritten answers (A-E) beside question numbers. This automation eliminates the tedious and error-prone manual grading process, making it ideal for educational institutions seeking a more efficient grading solution.

In addition to grading, RajaMark offers tools to compile class results, allowing educators to aggregate individual scores and generate comprehensive reports on class performance in quizzes and tests. This feature helps teachers quickly identify trends and areas for improvement, streamlining the assessment process. Overall, RajaMark is a valuable resource for schools and universities aiming to improve the speed and accuracy of MCQ evaluation while reducing the workload on educators.

2.0 Getting Started

2.1 Operating System Requirements

RajaMark requires (either one):

- the 64-bit version of Microsoft Windows 10 or later. These versions of Windows should include the required [Windows PowerShell](#) 5 or later.
- macOS 10.15 (Catalina) or later. This guide presumes your Mac runs the [zsh](#) as your default shell.
- Debian Linux 11 or later and Ubuntu Linux 20.04 LTS or later.
- ChromeOS.

2.2 Installation Steps

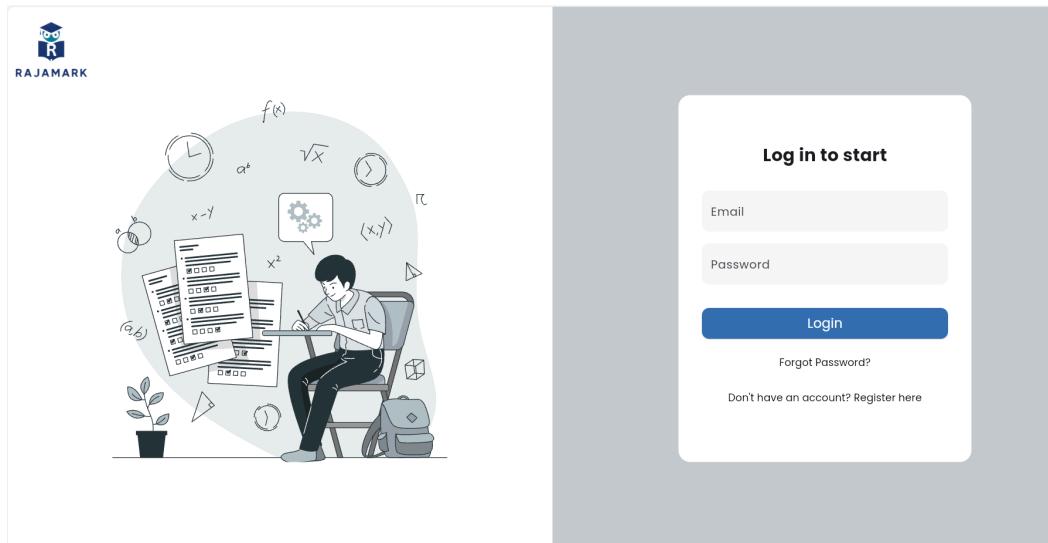
To install RajaMark:

1. Click [here](#) to access our Google Drive.
2. Download the .exe file.
3. Click the .exe file and allow it to make changes to your computer for execution.
4. You are all set.

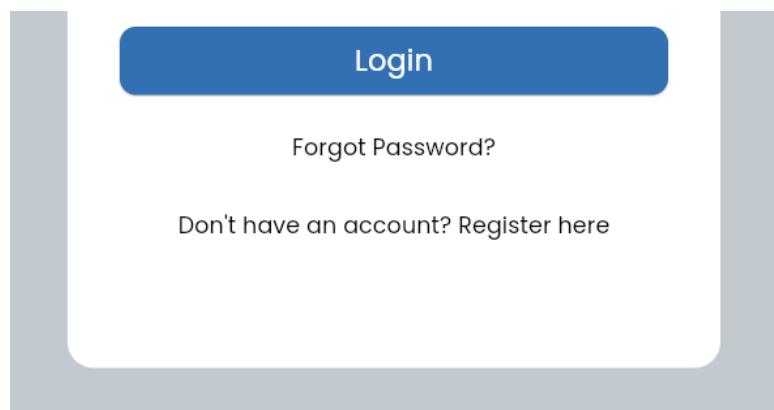
2.3 Account Setup

2.3.1 Register

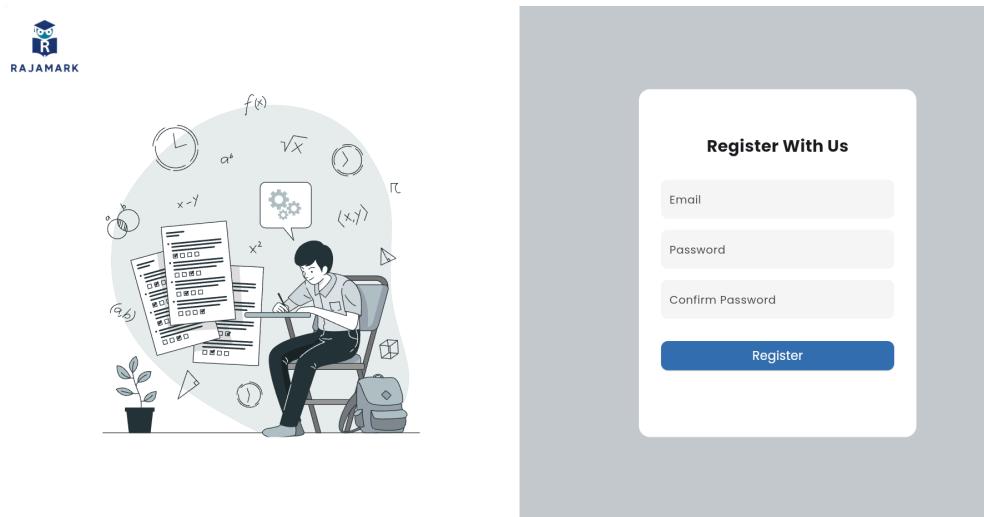
1. Upon first launch into the system, you will be asked to enter your email and password to log into your existing account in the Login page.



2. If you have not set up an account before, click the “Don’t have an account? Register here” button. If you have already registered an account, go to [Login](#).



3. You will be asked to give your email and password that you intend to use. Upon completing the registration, you will have to enter your password once again for confirmation.



4. Click the “Register” button once you have filled in the required information for registration.
5. You will be redirected to the [Login](#) if you have registered successfully.

2.3.2 Login

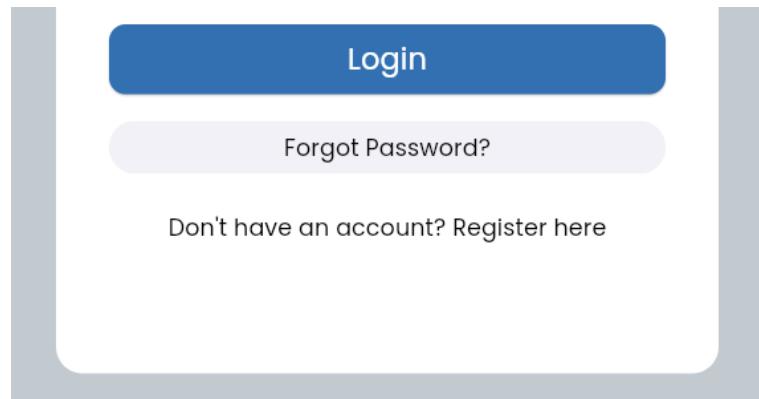
1. In the Login page, fill in your email or username and password then click on the “Log in” button.

The image shows a login interface with a light gray background. At the top center, the text "Log in to start" is displayed in bold. Below this are two input fields: "Email" and "Password", each with a placeholder text inside. A large blue rectangular button labeled "Login" is positioned below the password field. To the right of the "Login" button, there is a "Forgot Password?" link. At the bottom of the form, there is a link "Don't have an account? Register here".

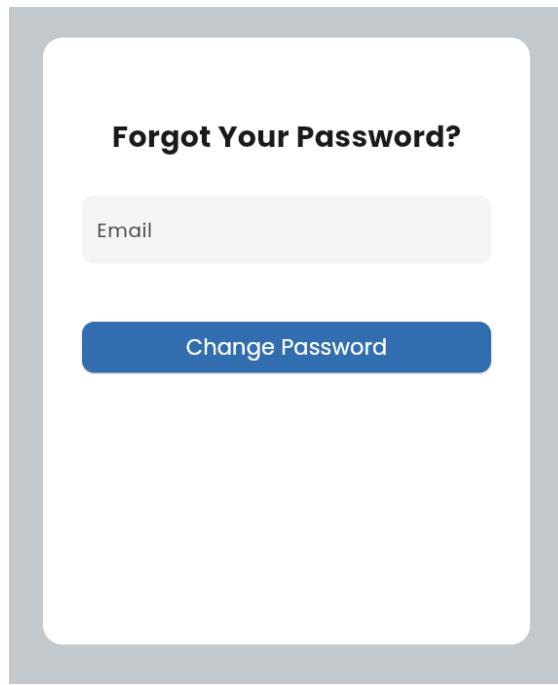
2. If you have forgotten your password and wish to create a new one, proceed to [Forgot Password](#).

2.3.3 Forgot Password

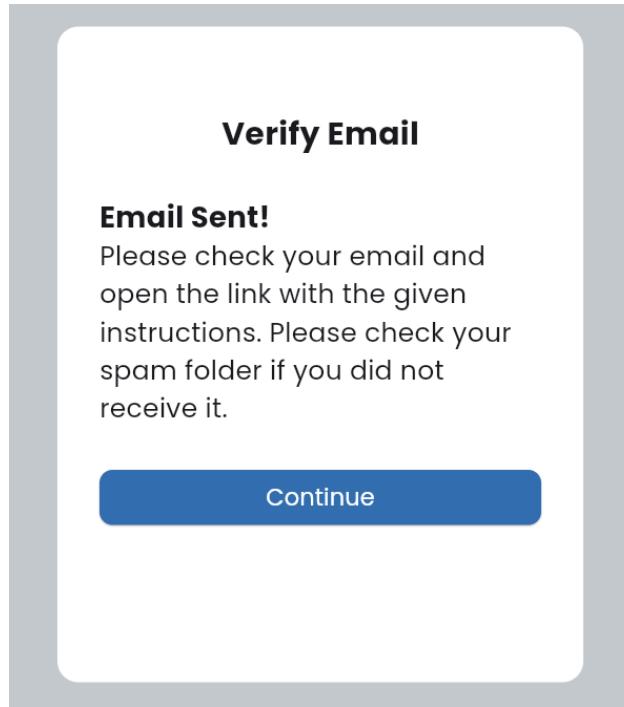
1. Click on the “Forgot Password?” button.



2. Enter your registered email address to receive a password reset link to change your password.

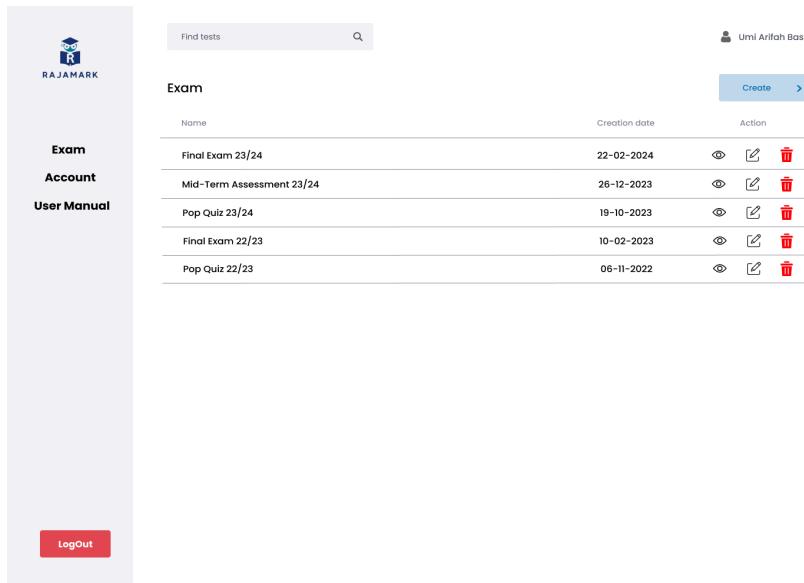


3. You will be shown with this message if you have entered a valid email address.



2.3.4 Logout

1. After successfully logged in, you will now see the Homepage (dashboard page) like the picture below:



The dashboard page displays a sidebar with 'RAJAMARK' logo, 'Exam', 'Account', and 'User Manual' options. A red 'LogOut' button is at the bottom. The main area shows a table of exams with columns for Name, Creation date, and Action (with icons for view, edit, and delete). The table data is as follows:

Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

2. If you wish to log out, navigate to the navigation bar located at the leftmost of the screen and click on the "LogOut" button. You will then be redirected to the Login page again.

2.4 Navigation

Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

1. Exam Page

The Exam Page contains all exams that have been created. The exams can be edited or deleted from this table. The date of creation will also be displayed on this page. It is also possible to create a new exam from this page.

2. Account Page

The Account Page will display the user's information. Users will also be able to check and manage their account subscription on this page.

3. User Manual Page

The User Manual Page contains the documentation of the user manual that provides detailed instructions on how to use this system effectively.

4. LogOut

Navigate to the navigation bar located at the leftmost of the screen and click on the "LogOut" button if you wish to log out from your account.

3.0 Features

3.1 Exam Creation

1. Go to the Exam page.
2. Click on the “Create” button to create a new examination/quiz.

The screenshot shows the RAJAMARK software interface. On the left is a vertical sidebar with icons for Exam, Account, and User Manual, and a Logout button at the bottom. The main area has a header with 'Find tests' and a search bar. Below it is a user profile for 'Umi Arifah Basri'. The central part is titled 'Exam' and lists several exams with columns for Name, Creation date, and Action (edit and delete). A red circle highlights the 'Create' button in the top right of this section.

3. Enter the examination's details and grading's criteria.

The screenshot shows the 'Create Exam' form. The left sidebar includes Home, Account, and User Manual options. The main form has a back arrow and the title 'Create Exam'. The 'Exam Details' section contains fields for Exam Title (Final Exam 23/24), Exam Description (This exam is the final exam for software process and quality fro 23/24), Course Code (WIF3002), and Session (23/24). To the right is a 'Grading System' table with the following data:

	Grade	Score	Grade	Score
A	80	-	100	
A-	75	-	79	
B+	70	-	74	
B	65	-	69	
B-	60	-	64	
C+	55	-	59	
C	50	-	54	
D	40	-	49	
F	0	-	39	

Below this is the 'Answer scheme' section, which includes 'Question 1'.

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4. Scroll down to enter the answer scheme.

The screenshot shows the RAJAMARK software interface. On the left, there is a vertical sidebar with icons for Home, Account, and User Manual, and a Logout button at the bottom. The main area has a header with a search bar labeled 'Find tests' and a user profile icon for 'Umi Arifah Basri'. Below the header, a back arrow and the text 'Create Exam' are visible. The central part of the screen is titled 'Answer scheme' and contains three question boxes. Question 1 has options A, B, C, and D, with D highlighted in green. Question 2 has options A, B, C, and D, with B highlighted in green. Question 3 has options A, B, C, and D, with C highlighted in green. At the bottom of the 'Answer scheme' section is a large blue button with a plus sign '+'. At the very bottom of the page are 'Back' and 'Save' buttons.

5. Click the “save” button to create the examination record.
6. The examination record is successfully created.

3.2 Edit Examination

1. Go to the Exam page.
2. Click on the “edit” icon for the specific exam to be edited.

The screenshot shows a user interface for managing exams. On the left is a sidebar with 'RAJAMARK' logo and links for 'Exam', 'Account', and 'User Manual'. The main area has a search bar 'Find tests' and a 'Create' button. A table lists exams with columns for 'Name', 'Creation date', and 'Action'. The 'Action' column contains icons for edit (pencil) and delete (trash). One edit icon for 'Final Exam 23/24' is circled in red.

Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

3. Enter the changes required in the Edit Exam page.

The screenshot shows the 'Edit Exam' page. On the left is a sidebar with 'Home', 'Account', and 'User Manual'. The main area has a back arrow, a title 'Edit Exam', and a 'Next' button. It displays 'Exam Details' with fields for 'Exam Title' (Final Exam 23/24), 'Exam Description' (This exam is the final exam for software process and quality fra 23/24), 'Course Code' (WIF3002), and 'Session' (23/24). To the right is a 'Grading System' table:

	80	-	100
A-	75	-	79
B+	70	-	74
B	65	-	69
B-	60	-	64
C+	55	-	59
C	50	-	54
D	40	-	49
F	0	-	39

Below this is an 'Answer scheme' section for 'Question 1' with options A, B, C, and D. Option D is highlighted in green.

4. Scroll down and click the “save” button to apply the changes.

3.3 View Exam's details

1. Go to the Exam page.
2. Click on the “eye” icon for a specific exam to view the exam’s details.

Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

3. You will be directed to the Exam Details page.

Student ID	Name	Result	Actions
U200123	Ikhwan	100 %	

3.4 Manage student's answer

1. Go to the Exam page.
2. Click on the “eye” icon to view the exam’s details.

The screenshot shows a user interface for managing exams. On the left, there is a sidebar with a logo and navigation links: 'Exam', 'Account', and 'User Manual'. Below the sidebar is a red 'Logout' button. The main area has a header with 'Find tests' and a search bar. A user profile 'Umi Arifah Basri' is at the top right. The central part is titled 'Exam' and contains a table with the following data:

Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

3. Once redirected into the Exam Details page, navigate to the list of students’ records and click on the “eye” icon to view the student’s details, “note” icon to edit the student's details or “trash” icon to delete the student's information.

The screenshot shows the 'View details' page for an exam. The sidebar includes 'Home', 'Account', and 'User Manual' with a red 'Logout' button. The main content has a header with 'Find tests' and a search bar, and a user profile 'Umi Arifah Basri'. Below is a section titled '← View details' with exam details: 'Exam Title: Final Exam 23/24', 'Exam Description: This exam is the final exam for software process and quality fro 23/24', 'Course Code: WIF3002', and 'Session: 23/24'. Two circular charts show 'Mean score' (66%) and 'Median score' (81%). At the bottom, a table lists a student record: 'Student ID: U200123', 'Name: Ikhwan', 'Result: 100 %', and 'Actions' with icons (eye, edit, delete) circled in red.

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4. On the Student's Details page, click the “Edit Result” button to make changes to the student's details.

The screenshot shows the RAJAMARK software interface. On the left, there is a vertical sidebar with a logo at the top, followed by three menu items: "Home", "Account", and "User Manual". Below the "User Manual" item is a red "LogOut" button. The main content area has a header with "Find tests" and a search icon. In the center, there is a blue bar with "Results (View)" and "Edit Result" buttons. To the right of this bar, it says "Student Answer" and "3/4". Below this, there is a "Paper Image" section containing a grid of handwritten responses. The grid has columns labeled A, B, C, D and rows labeled 1 through 12. Some responses are marked with circles or squares. At the top of the paper image section, there is some text about marking the grid correctly. The overall interface is clean and modern.

3.5 Upload Sample Answer

1. Go to the Exam page.
2. Click on the “eye” icon to view the exam’s details.

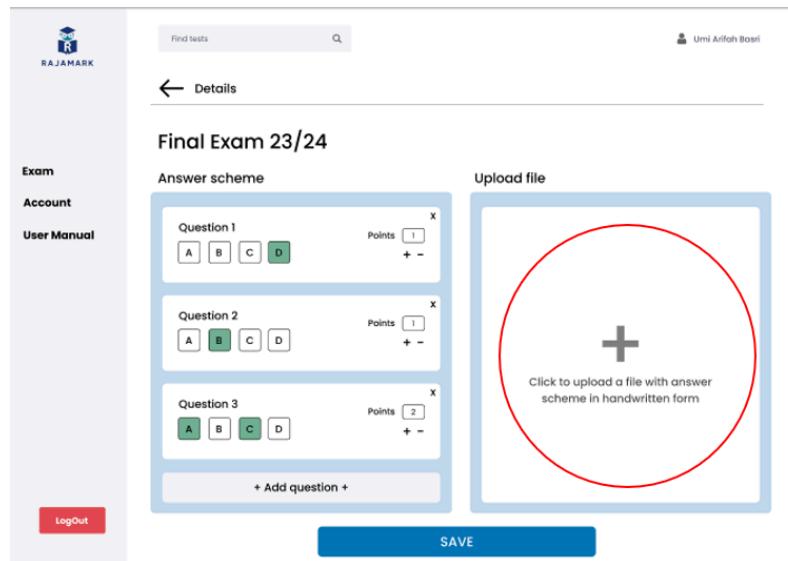
Name	Creation date	Action
Final Exam 23/24	22-02-2024	
Mid-Term Assessment 23/24	26-12-2023	
Pop Quiz 23/24	19-10-2023	
Final Exam 22/23	10-02-2023	
Pop Quiz 22/23	06-11-2022	

3. Click on the “Upload answer” button to upload the sample answer scheme.

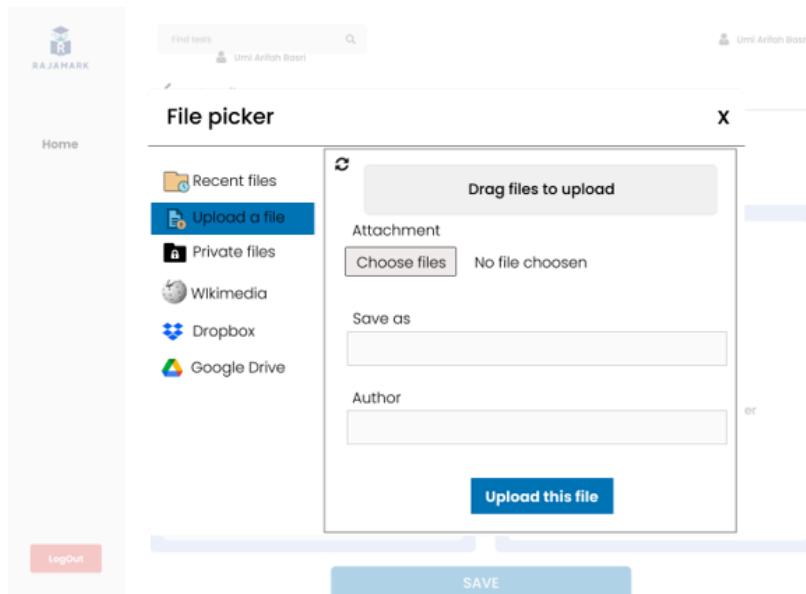
Student ID	Name	Result	Actions
U200123	Ichwan	100 %	

4. Once redirected into the Answer Scheme page, click the “+” icon to upload the sample answer scheme.

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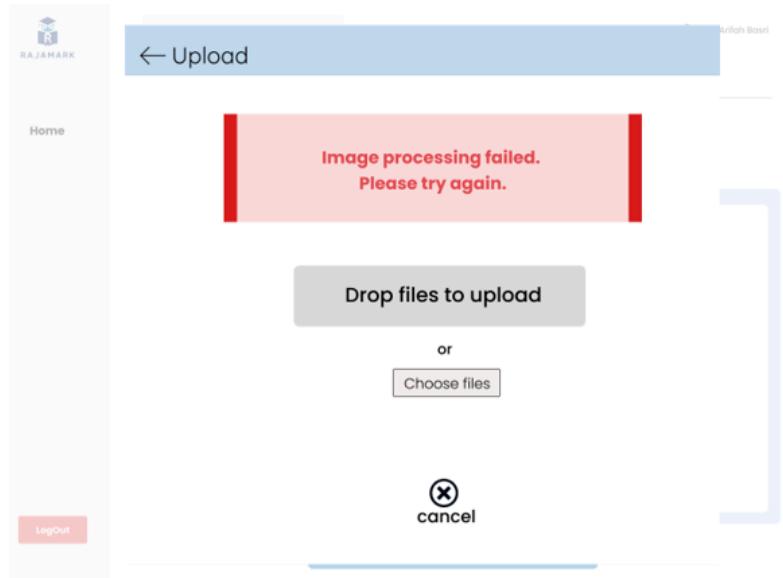


5. Upload the answer scheme file.



6. If the image processing fails, try to upload another file with a clearer view of the answer scheme.

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7. Wait for the file to be processed.



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8. Click the “confirm” button to apply the answer scheme.

The screenshot shows the RAJAMARK software interface on the "Details" page for a test titled "Final Exam 23/24".
On the left, there is a sidebar with a logo and the word "RAJAMARK". Below the logo, there are "Home" and "Logout" buttons.
The main content area has a header "Final Exam 23/24".
Under "Answer scheme", there are three questions:

- Question 1: Points 1. Options A, B, C, D. Option B is highlighted green.
- Question 2: Points 1. Options A, B, C, D. Option B is highlighted green.
- Question 3: Points 2. Options A, B, C, D. Options A, B, and C are highlighted green.

Below the answer scheme, there is a "Upload file" section containing a scanning zone grid and a "Discard" button.
At the bottom, there are two buttons: "Show answers" and "Edit result" on the left, and "Discard" and "Confirm" on the right.

3.6 Upload Student Answer

1. Go to the Exam page.
2. Select the exam you wish to grade.

3. In the student column, locate and click the "Add" button to input student data.

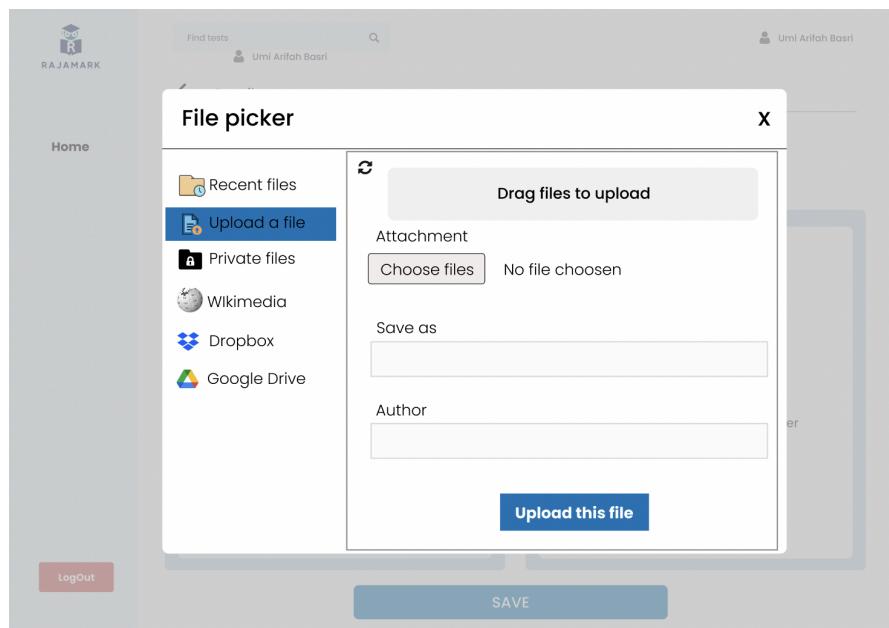
4. Enter the student's ID and name into the designated fields.
5. Click the "Upload" button to update the student's answer sheet.

A screenshot of a modal dialog box. It contains three input fields: "Student ID" with value "U2000123", "Name" with value "Ikhwan", and "Answer Sheet" with a "Upload" button. At the bottom are "Cancel" and "Upload" buttons, with "Upload" being highlighted.

Student ID	:	U2000123
Name	:	Ikhwan
Answer Sheet	:	Upload

Cancel **Upload**

6. To add the student's answer sheet, either drag a file or use the "Choose files" option to select the file from your computer.
7. After selecting a file, refer to [Image Preprocessing](#) for more details.



8. The student's details will be displayed on the page for confirmation.
9. Repeat steps 2 to 7 to add more students as necessary.
10. Once you have finished adding all students, click the "Save" button to save the student records.

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RAJAMARK

Find tests

Umi Arifah Basri

← Details

Home

Final Exam 23/24

Answer scheme

Question 1
A B C D

Question 2
A B C D

Question 3
A B C D

Students

Student ID : U2000123
Name : Ikhwan

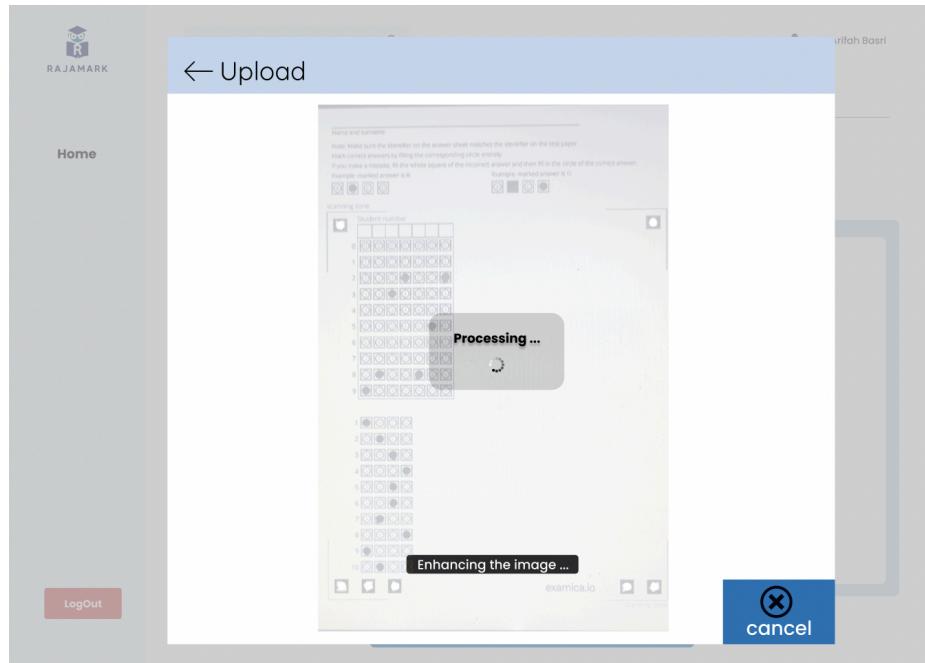
+
Click to add student data

Logout

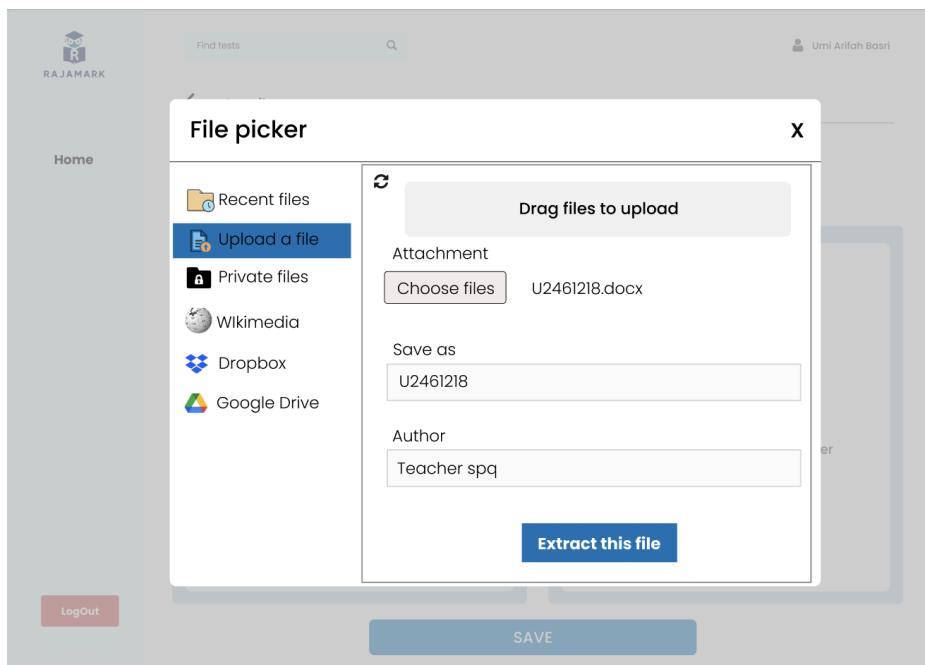
SAVE

3.7 Image Preprocessing

- Once a file is selected for upload, the system will begin processing the image.

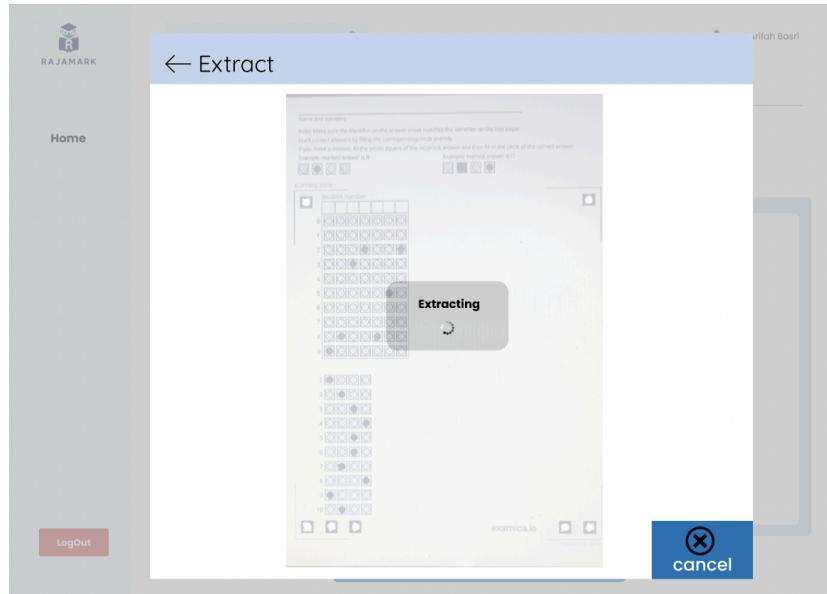


- After successful processing, users are required to enter a file name for saving and the author's name. (In case of processing failure, refer to [Troubleshooting](#) for more info)
- Click on "Extract this file" to initiate OCR processing.



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4. The system will commence extracting text from the image.



5. Upon successful extraction, the extracted text (answers) will be displayed.
6. If the extracted data is incorrect, users may request a reupload. Otherwise, proceed to Step 7 of [Upload Student Answer](#) if no issues arise.

3.8 Score Calculation and Reporting

1. Go to the Exam page.
2. Select the eye icon of the exam you wish to view.
3. Upon uploading students' answers, the system will automatically calculate the score for each student and calculate the mean and median score of the class. (Refer to [Upload Student Answer](#) to know more about uploading student's answer)
4. To generate a report, click on the "Generate Report" button.
5. The report will include statistical measures such as the median, mean, and other relevant statistics.

4.0 Troubleshooting

4.1 Common Issues

NO	Issues	Issue Description	Solution
1	Poor Image Quality	OCR accuracy may decrease if the input images are of low resolution or contain artifacts such as blurriness or distortion.	Ensure that input images are clear, well-lit, and have sufficient resolution. Avoid using images with excessive noise or compression artifacts.
2	Unsupported Fonts	Certain fonts or styles may not be recognized accurately by the OCR system, leading to errors in text extraction.	Whenever possible, use standard fonts and avoid decorative or obscure fonts that may not be recognized reliably by the OCR system.
3	Complex Layouts	Documents with complex layouts, such as tables, columns, or mixed fonts, can pose challenges for OCR algorithms and result in incorrect text extraction.	If possible, preprocess documents to remove complex layouts or convert them into simpler formats before performing OCR. This can help improve accuracy and reduce errors.
4	Handwritten Text	Our product is encountering difficulties accurately recognizing handwritten text	For handwritten text, please ensure that the handwriting is clear and legible, and that the document is properly scanned or photographed for optimal results.

4.2 Support Contact

If you encounter any issues with the OCR system that cannot be resolved using the provided solutions, please contact our support team for assistance:

Email: spqprojectmanager@gmail.com

5.0 Best Practices

5.1 Grading Tips

1. Ensure students format answers consistently and legibly to aid OCR accuracy.



2. Advise clear separation of answers for each question to minimize ambiguity.



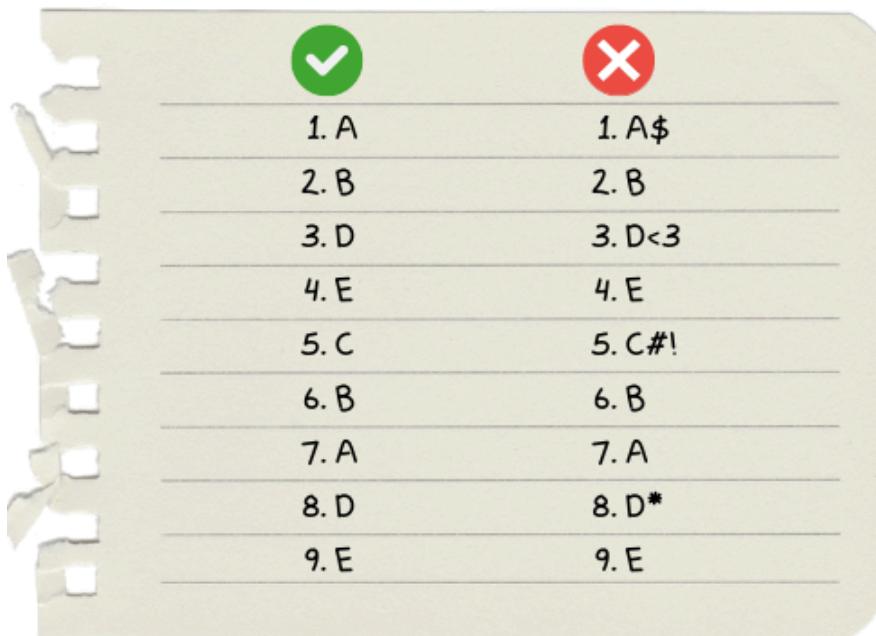
3. Caution against overlapping answers to enhance OCR interpretation.



4. Scan answers at high resolution in well-lit conditions for optimal recognition.
5. Encourage manual review of extracted text for clarity before submission.
6. Ensure students use dark, bold pens or pencils for writing to improve OCR readability.



7. Remind students to avoid excessive use of decorative elements or symbols that may interfere with OCR recognition.



8. Provide guidelines for students to write numbers and symbols clearly, especially those prone to misinterpretation
9. Advise against folding or creasing answer sheets, as it can distort text and hinder OCR accuracy.
10. Recommend students to use a ruler or straight edge for neat alignment of answers to improve OCR alignment.



5.2 Accuracy Recommendations

1. Provide clear handwriting guidelines to optimize OCR recognition; for example, require all multiple-choice answers to be in capital letters.
2. Conduct regular practice sessions to familiarize students with handwriting recognition and improve their writing.
3. Offer constructive feedback to students to enhance handwriting quality and OCR accuracy.
4. Provide comprehensive user training to educators to address accuracy challenges effectively.
5. Develop a standardized answer sheet template with clear instructions and designated areas for answers to facilitate OCR processing.
6. Encourage students to practice writing in a consistent style and size to aid OCR recognition.

6.0 Glossary

Term	Definition
Optical Character Recognition (OCR)	The technology used to convert different types of documents, such as scanned paper documents, PDF files, or images captured by a digital camera, into editable and searchable data.
Resolution	The level of detail that an image holds. In the context of scanning, it measures the number of pixels per inch (PPI) or dots per inch (DPI) in a digital image.
Layout	The arrangement of text, images, and other elements on a document or webpage.
Handwriting Recognition	The process of converting handwritten text into digital text. It involves analyzing and interpreting handwritten characters to recognize and convert them into machine-readable text.
Calibration	The process of adjusting and fine-tuning equipment or software to ensure accuracy and consistency in performance. In the context of scanning, calibration may involve adjusting settings such as brightness, contrast, and color balance to optimize image quality.
Standardized Format	A predefined layout or structure that follows specific guidelines or conventions. In the context of answer sheets, a standardized format ensures consistency in the presentation of questions and answers, facilitating accurate interpretation and grading.
Alignment	The positioning of text or objects relative to a reference point or line. In the context of OCR, alignment ensures that text is accurately detected and interpreted within predefined boundaries or regions.
Noise	Random variations or interference in an image that can degrade quality and affect OCR accuracy.
Preprocessing	The process of applying various techniques to raw data, such as images or text, to improve quality, enhance features, or prepare it for further analysis.

7.0 Appendix

7.1 Frequently Asked Questions

1. Which platforms are RajaMark compatible with?

A: RajaMark is designed to be compatible with multiple operating systems, which are Windows, macOS, Linux, Android and iOS.

2. How does RajaMark automate answer sheet grading?

A: RajaMark assumes the adherence of the answer sheets uploaded to a standardized format and layout, and conducts recognition of students' handwriting with OCR technology to compare the answers with the sample provided.

3. What format should the answer sheets uploaded be in?

A: The answer sheets should have the answers consistently written next to the corresponding question numbers in a predetermined manner and written in Capital Letters (e.g., letters A-E)

4. How does RajaMark ensure its accuracy in text recognition to compare uploaded answer sheets with the sample answers?

A: While we try our best to produce the most accurate text recognition results using OCR technology, it is inevitable to face minor inaccuracies in detecting handwritten answers. Hence, we highly advise users to conduct a thorough checking of the graded answers and make the necessary corrections on the Student Answer Page.

5. Can I modify the grading system for a subject?

A: Yes! After the user has created a subject under the Exam Details page, a default grade will be automatically set for the subject and users can click "Edit" to amend the existing grading system.