Smart CA: An AI-Powered Virtual CA Assistant and Financial Automation Platform

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***Abstract*—Financial management is a responsibility for individuals, middle-class families, small businesses and Chartered Accountants. Handling documents keeping track of income and expenses preparing reports and planning savings by hand can take a lot of time and often leads to mistakes. This paper introduces Smart CA, an AI-powered assistant and financial management platform that makes managing financial records and doing basic financial analysis easier. The system is designed to extract details from uploaded financial documents using document processing and optical character recognition when necessary. It will sort income and expenses calculate financial summaries categorize spending and offer insights on budgets and savings. The platform will also feature a chatbot that answers questions based on authorized financial records, a financial goal planner for education, housing and emergency funds and a collaboration module, for Chartered Accountants and their clients. Charts, reports and alerts will help users better understand their situation. The goal of the proposed platform is to make financial information more accessible and improve planning for both regular users and professionals.**

***Index Terms*—Artificial intelligence, financial chatbot, financial document analysis, household budgeting, optical character recognition, personal finance management.**

I. INTRODUCTION

Financial management matters for people, families, small companies and certified accountants. Financial papers like bills, invoices, bank statements, spreadsheets and tax documents hold details but these files are usually kept in different places and in different formats. People might have to type the data over and over into different files figure out totals on their own and look through transactions to get a clear idea of their money situation. These tasks take time. Can lead to mistakes.

For accountants and companies looking at financial records means sorting papers finding money coming in and going out making reports and checking details before making decisions about money or taxes. For families financial management is about keeping track of money coming in each month managing spending, saving money and getting ready for needs. Many tools on the market only cover one part of this work like tracking expenses scanning receipts or showing data.

Smart CA is an idea for a platform that combines financial analysis from documents with planning for personal and family money. It wants to turn documents into organized records give summaries and charts and let users ask questions about their own money through a chatbot. It also includes a goal planner for things like school, a home and emergency savings. Sharing documents between clients and accountants with permission.

II. RELATED WORK

A. Optical Character Recognition

Optical character recognition is a method used to turn printed or scanned text into text that computers can read. Smith presented an overview of the Tesseract OCR engine[1]. OCR is useful for pulling text out of invoices, receipts and other financial documents. The quality of the extracted text can depend on things, like image resolution how the document is laid out how well it was printed and whether there is any

handwritten content. Because of this it's important to check financial information before doing any calculations.

B. OCR-Based Expense Tracking

OCR-based expense tracking takes paper documents. Turns them into digital files. It also helps organize money-related transactions. Machine learning can be used to sort these transactions based on what they say and other details[2]. These methods are important for Smart CA because they cut down on repeating data entry and help people see how they spend money. The system we are suggesting adds features, like business summaries, home budgeting, planning financial goals and sharing documents in a safe way. How well all these features work together needs to be tested in experiments.

C. Financial Chatbots

Financial chatbots offer a way for people to talk about services and get information. Shi, Chen and Zaidi created AVA, a chatbot for services that uses deep bidirectional transformers [3]. This research gives background on helping people with financial questions through conversation. For Smart CA the answers, from the chatbot must be based on records and real numbers instead of guesses. If the information is not there or if a question needs expert thinking the system should say that it cannot help with that.

D. Document Understanding Techniques

Document understanding techniques help systems. Make sense of text, including where the text is located and how it is structured within a document. LayoutLM brings together text and layout details to improve the understanding of document images [4]. Donut looks at document understanding without depending on an OCR step [5]. LayoutLMv3 builds on this by using text and image masking to advance document AI [6]. These approaches offer insights for creating the document-processing part of Smart CA. However their effectiveness, for documents still needs to be tested.

E. Language Models for Financial Text

Pre-trained language models can help with natural language processing tasks. BERT is a transformer-based model designed to learn text representations [7], while FinBERT applies language modelling techniques to financial text analysis [8]. Further research has explored financial question answering and numerical reasoning. FinQA focuses on answering questions that require numerical reasoning over financial data [9], while DocFinQA addresses question answering over long financial documents [10]. These studies are relevant to the proposed Smart CA system, which aims to analyze financial documents and answer user queries. However, the chatbot should verify its responses against authorized financial records and should not rely on unsupported information.

F. Research Gap

The selected literature lays the groundwork for optical character recognition, expense tracking and financial conversational assistance. Smart CA aims to bring these abilities with simpler business analysis, personal financial planning, goal tracking and better collaboration between the client and the assistant. The research focuses on building and testing this workflow.

This gap does not mean that no similar apps exist. It is a reason to build this system, not a statement that nothing like it has been made before. To truly see what is new about this proposal a review of existing literature and a careful comparison, with current financial management tools will be needed.

III. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

Financial information usually appears in places such as invoices, receipts, bank statements, spreadsheets and handwritten expense lists. Users must often enter information again and again add up totals one by one and look over many records to see where financial information belongs. Families sometimes struggle to link spending with their savings goals while businesses and CAs need clean records for financial information checks.

To address these challenges, the proposed Smart CA system aims to extract financial information from supported documents, organize it into structured records, generate basic financial summaries, answer questions using authorized records, and assist households with budgeting and savings goals. The

system will also allow users to verify extracted information and control access to sensitive financial records.

B. Proposed Objectives

The proposed system aims to reduce manual entry organize financial documents calculate basic financial indicators categorize expenses and provide conversational access, to authorized records. The proposed system also aims to help households plan spending and savings goals while allowing clients to share selected records securely with CAs.

C. Scope of the System

The platform is intended for individuals, households, small businesses and CAs. The platform focuses on financial document organization, basic analysis.

IV. PROPOSED SYSTEM AND METHODOLOGY

The proposed Smart CA system is designed as a web based application that includes a user interface, a document processing pipeline, a financial database, analysis services, a chatbot and a reporting module. Smart CA aims to bring all these elements.

A. User Authentication and Roles

Users must authenticate before they can access their financial information. The proposed system includes the following roles:

household user: This user uploads personal financial documents, reviews transactions, monitors expenses and creates savings goals.

Business client: This user uploads business records and reviews financial summaries.

Chartered Accountant: This user reviews records that are explicitly shared by a client and helps with interpretation.

Administrator: This user manages authorized system-level operations and application configuration.

Role-based access control would ensure that each user can only access the records and functions that are allowed for their role.

B. Financial Document Upload

The system is designed to accept PDF files, spreadsheets and scanned document images. The system will check each uploaded file for the file type and, for an acceptable size before the system begins processing. For each document the system records the owner, the upload date the document type and the processing status.

The system can read documents that already have embedded text directly. For scanned documents and images the system uses OCR. The system keeps the document safe so that users can compare the extracted values with the original source.

C. Text Extraction and Data Validation

The proposed document-processing workflow consists of the stages:

File validation: File validation must check if the uploaded document uses a supported format and if its size is, within allowed limits.

Text extraction: Text extraction should pull out embedded text or use OCR to read scanned documents.

Field identification: Field identification must spot candidate dates, descriptions transaction amounts, invoice numbers and other important financial fields.

Data normalization: Data normalization should make all date formats, numbers, currency values and descriptions match a standard.

Validation: Validation must find fields, duplicate records amounts that are not valid and totals that do not match.

User verification: User verification should show the extracted fields so that a user can review and correct them before they are used in summaries.

Different document types may need extraction rules. A bank statement, an invoice and a spreadsheet should not be assumed to share the structure. Fields that are ambiguous or have confidence should be flagged for manual verification.

D. Financial Record Organization

After checking everything the information we get will be put into files. A file about a transaction might have a transaction number, a user number, a source document number, the date a note whether it is money coming in or going out the amount, the type of money the group it belongs to and if it has been checked.

Keeping a connection to the document will let users find the real record where a financial amount came from. Finding the transaction more, than once and getting user approval will help make sure we don't count the same thing twice.

E. Financial Analysis

The proposed analysis module would figure out financial numbers using records that have been checked and confirmed.

Monthly savings can be found like this:

Monthly Savings = Total Monthly Income − Total Monthly Expenses

Also a simple business result can be worked out as:

Simplified Profit or Loss = Recorded Revenue − Recorded Expenses

These formulas give a quick look at the numbers. They don't include things like accounting changes, tax rules, depreciation or differences in when thingsre recorded. So the system must not show these results as audited financial statements.

If the needed details are in the verified records GST-related summaries can be created.. Tax amounts owed credits you might qualify for and decisions, about filing need to be checked carefully and reviewed by a professional.

F. Expense Categorization

The system might start by using rules and keywords that are already set to sort out expenses. A machine learning model, like a Random Forest classifier might be tested for grouping transactions if there is a set of data that has already been labelled.

Some possible groups are food, housing, transport, education, health care, utilities, business costs and other costs. People using the system should be able to fix any groupings. Any test of a model should use a set of data and the right ways to check how well it works.

V. SYSTEM ARCHITECTURE

The new Smart CA system uses a structure to handle financial documents and offer artificial intelligence powered financial help. It has the following layers:

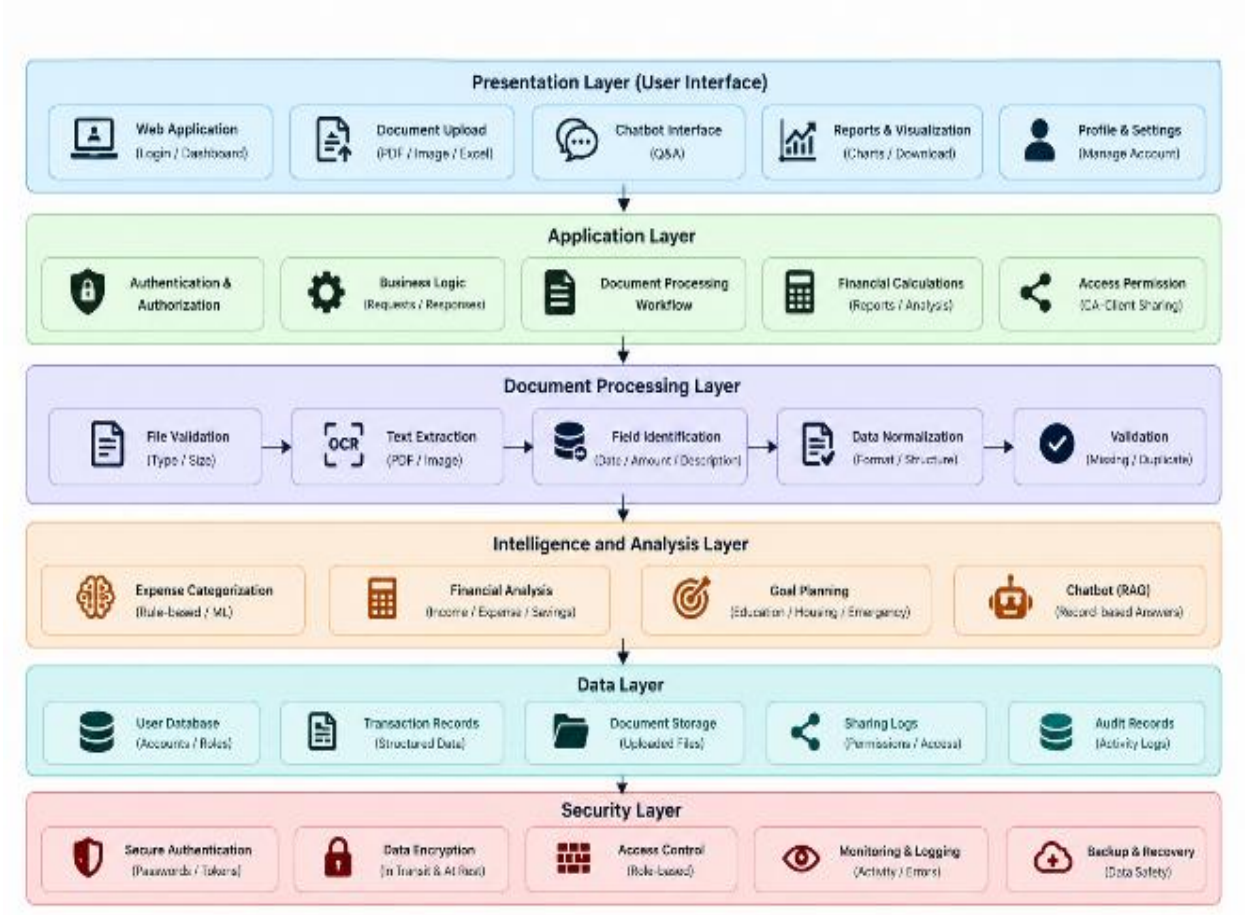

Fig. 1. Proposed System Architecture of Smart CA

Presentation Layer provides the user interface for login, document upload, chatbot interaction and viewing reports.
Application Layer manages user requests, authentication, document processing workflow, financial calculations and CA-client access permissions.
Document Processing Layer extracts text and financial details from PDF files scanned images and spreadsheets using OCR and document parsing techniques.
Intelligence and Analysis Layer performs expense categorization, financial analysis, household budget planning, financial goal planning and AI-based chatbot responses.
Data Layer stores user information, structured records, uploaded documents and relevant activity logs.
Security Layer provides authentication, role-based access control, data protection and activity monitoring.
The system processes uploaded documents, extracts and validates relevant information and generates financial summaries, visual reports and responses, to user queries. The proposed architecture aims to support both CA-related analysis and household expenses.

VI. ALGORITHMS AND TECHNIQUES

A. Rule-Based Classification Algorithm

Rule-Based Classification is applied in order to automatically classify financial transactions into incomes, food, shopping, rent, transport, and utility payments. Such transactions can be easily organized using several tags to manage expenses and analyze the current financial situation in a clear and structured way.

B. Arithmetic Calculation Algorithm

The Arithmetic Calculation Algorithm calculates financial values, such as total income, total expenses, available balance and business profit or loss. The Arithmetic Calculation Algorithm processes records with math operations and shows the results, on the user dashboard. The Arithmetic Calculation Algorithm helps people keep track of their budgets. Helps business owners understand how their business is doing.

C. Duplicate Detection Algorithm

The Duplicate Detection Algorithm looks for transactions that might be repeated to stop the same entry from being added more than once. It checks details, like the date of the transaction the amount, the reference number and the description to find duplicates. If a duplicate is found the system can let the user know. Ask them to check before the entry is accepted. This method makes financial records more accurate and more trustworthy.

D. Rule-Based Alert Algorithm

The Rule-Based Alert Algorithm keeps an eye on rules that users set. It watches for conditions and sends out alerts when those conditions are met. For instance if a user spends more, than their budget limit the system sends a notification. It also alerts users when their remaining budget is running low. These alerts help people keep their spending in check. They also help business owners track their expenses and stay on top of their finances. The system supports financial habits by providing timely reminders. This way users can make decisions and avoid overspending.

E. Date-Based Scheduling Algorithm

The Date-Based Scheduling Algorithm manages financial deadlines and schedules reminders for important payment dates. It stores due dates for rent, electricity bills, loan instalments, and other recurring financial obligations. The system compares scheduled dates with the current date and generates reminders according to predefined notification rules. This technique helps users avoid missed payments and supports timely financial management.

F. Role-Based Access Control (RBAC)

Role-Based Access Control is a security method used to limit access to information based on the users assigned role. In Smart CA the system creates roles like Individual, Business Owner and Chartered Accountant (CA) each, with their set of permissions. Individuals can handle their financial records. Business Owners can view their business accounting information. CAs can look at client records. This method helps keep data controls how information is shared and ensures safe management of financial records.

VII. MATHEMATICAL MODEL AND FINANCIAL CALCULATIONS

The proposed Smart CA system uses mathematical models to perform basic financial calculations and support financial planning. The mathematical model processes validated financial records to calculate savings, analyze expenses, estimate future expenses, and monitor financial goals.

A. Monthly Savings Calculation

Monthly savings are calculated by subtracting total expenses from total income.

$$S = I - E$$

Where (S) represents savings, (I) represents total income, and (E) represents total expenses. This calculation helps users understand their monthly financial position.

B. Expense Distribution Analysis

The percentage of expenditure for a particular category is calculated as:

$$P_i = \frac{E_i}{E_T} \times 100$$

Where (E_i) is the expenditure for category (i), and (E_T) is the total expenditure. This calculation helps identify major spending categories.

C. Financial Goal Planning

The required monthly savings for a financial goal are estimated using:

$$M = \frac{G - C}{T}$$

Where (G) is the target amount, (C) is the current savings allocated to the goal, and (T) is the number of months remaining. This formula assumes that the remaining amount is saved equally each month and does not include interest or investment returns.

D. Expense Prediction

A simple moving-average method can estimate the next month's expenses using historical monthly expenditure:

$$\hat{E}_{next} = \frac{1}{n}\sum_{i=1}^{n} E_i$$

Where (E_i) represents the expenditure for month (i), and (n) is the number of historical months considered. The estimate depends on the availability and quality of historical financial data.

E. Basic Profit and Loss Calculation

The system can calculate a basic profit or loss from validated business records:

$$P = R - E$$

Where (P) represents the calculated result, (R) represents recorded revenue, and (E) represents recorded expenses. A positive result indicates a surplus, while a negative result indicates a deficit. This simplified calculation does not replace formal accounting or tax assessment.

These mathematical models are proposed components of Smart CA. Their accuracy and usefulness will be evaluated after implementation using suitable test data.

VIII. EXPECTED OUTCOMES AND EVALUATION PLAN

Because we have not yet tested the proposed system, the outcomes we mention are expectations. The outcomes are not measured findings.

A. Expected Outcomes

The system is designed to keep all documents and extracted records in one central place. It helps reduce the need for repeated data entry when possible. It can create financial summaries automatically. It allows users to ask questions, about their records using a chatbot. It also helps with managing household budgets.. It enables secure controlled sharing of documents.

The real value it brings depends on how the system can extract information how complete the records are, how easy it is to use and how accurate the financial calculations are.

B. Evaluation Methodology

After implementation the system must be evaluated using a documented set of documents that represent real-world cases. This set should include both files and scanned images with varying levels of quality such as clear, blurry or damaged scans. Sensitive real financial records may only be used if proper consent has been obtained and strong safeguards are in place to protect data.

The following evaluation measures are recommended:

Field extraction accuracy: Check how accurately the system extracts dates, descriptions and amounts by comparing them to verified reference data.

Expense classification: Use labeled transaction examples to calculate precision, recall and F1-score to measure how well the system classifies expenses.
Financial calculation correctness: Compare the totals generated by the system with totals calculated independently to ensure accuracy.
Chatbot correctness: Review whether the chatbot responses align with records and whether it handles questions it cannot answer properly.
Processing time: Record how long the system takes to process each type of document that it supports.
Usability: Gather structured feedback from users who complete specific tasks to assess ease of use and effectiveness.
Security testing: Test authentication mechanisms, access controls, document permissions and the ability to revoke access when needed.
The final evaluation report should include details, about the dataset used the testing process, actual results, known limitations and any errors that were observed. Any numerical performance claims should only be made after the experiments are fully completed and validated.

IX. CONCLUSION AND FUTURE SCOPE

This paper proposes Smart CA, a financial management platform that brings together financial document extraction, structured transaction records, basic financial analysis, conversational assistance, household budgeting, financial goal planning and CA-client collaboration.
Smart CA aims to make financial information easier to organize and review by linking documents, with clear financial summaries. Smart CA also helps households plan finances by tracking expenses and setting savings goals. The trustworthiness of Smart CA will rely on the quality of document extraction the soundness of validation steps the accuracy of calculations the grounding of the chatbot and the safe handling of data.
Future steps involve building Smart CAs architecture creating an authorized evaluation set testing OCR and expense classification checking the chatbots reliability and running usability and security tests. Later ideas could add chat, new document types, adjustable alerts and stronger report checks.
Smart CA must be evaluated before we claim it works well. Smart CA is meant to aid in organization and decision making but it should not replace professional accounting, tax, audit or other regulated tasks.

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