Article

Enhancing Organizational Efficiency through AI-Driven Information Systems Management

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Abstract: Research objective: To improve the administrative and organizational performance of institutions through a conversational interface that was designed in which the user enters his data and the results appear, the content of which is the most influential elements in this performance and provide future visions .Research tools: The research tools were embodied through the random forest method and using the Python programming language, and a set of factors from a set of establishments with different specializations were studied. Research results: High accuracy of 92% was achieved by the random forest. This designed model also had a significant impact on raising the quality of work in establishments by providing future visions and identifying the factors that most affect the quality of work, the most important of which was productive efficiency.

Keywords: "Interactive interface, performance enhancement, future visions**"**

1. Introduction

Business management in organizations has evolved significantly and is no longer traditional [1]. Modern methods have been introduced to help it choose the most appropriate option or decision for each situation the organization goes through [2]. At the forefront of these methods are those related to artificial intelligence, as it has been able to bring management of all kinds to development and accelerate its processes and increase the accuracy of work in addition to developing it to keep pace with development and achieve competitiveness [3][4][5][6][7]. However, we should not forget some obstacles that sometimes prevent the use of these methods, such as privacy and ensuring confidentiality [8]. But measures can be taken to neutralize the effect of these challenges [9][10]

The current research aims to explore how artificial intelligence can enhance the management of organizational information systems to improve the efficiency of administrative processes and support more accurate and faster decision-making, leading to improved organizational performance and the competitiveness of institutions.

Research problem

Decision-makers and managers in institutions and workplaces always need to make decisions quickly and envision the future in a timely manner. This is something that

management in general suffers from, as these managements lack a programming or modern approach that helps them in this matter.

Importance of the research

The scientific importance of the research is demonstrated through the design of a software algorithm based on a form of artificial intelligence capable of providing decision-makers with reports on their organization's status and the most important factors affecting its administrative and organizational performance. Through this, they can achieve their organization's goals in terms of accuracy, speed, and minimizing human errors, thus achieving high-quality performance and competitiveness.

Research objectives

• Using artificial intelligence to manage organizational processes in institutions

• Designing a software algorithm capable of providing insights that enable decision-makers to make decisions that achieve the institution's goals with high quality. • Automating the process of generating reports that analyze the current and future state of the institution.

Lecture review

Several recent studies have addressed the topic of the study sample. For example, both the study by Kassa et al. and the study by Al-Muayyad targeted the topic of the impact of artificial intelligence on management. The first study distributed a questionnaire to a number of employees, which reached 172 employees, to study the mediating role of quality in professional performance on what intelligence does in developing performance.[11] As for the second study, it chose a group of factors and studied their reaction to performance, and both indicated a strong relationship between intelligence and managerial efficiency.[12] As for the study by Rayatmaja et al., the study by Luthviani et al., and the study by Bhima et al., each of them addressed the impact of intelligence on a different field of study. The first of the aforementioned studies dealt with the military textile sector.[13] As for the second study, it dealt with the accounting sector.[14] As for the last study, it dealt with several disciplines and noted the difficulties that these methods face.[15]

The study by Nurkholis et al., addresses the proper use of artificial intelligence systems to achieve high performance and efficiency. The research concluded with a set of findings outlining the correct steps to be taken to achieve the desired goals. The most important of these steps is the precise selection of the appropriate method for the required task, as well as the involvement of decision-makers in the software design and periodic maintenance of this software. [16]

The study by Susanti et al., aimed to use Just-in-Time (JIT) production for inventory management. The study achieved its objective of managing the storage process and reducing costs. [17]

Added Value of the Research

The scientific importance of the research is demonstrated through the design of a software algorithm based on a form of artificial intelligence capable of providing decision-makers with reports on the status of their organization and the most important factors affecting the efficiency of its administrative and organizational performance.

2. Materials and Methods

The research followed a descriptive-analytical approach based on designing an AI-powered software model to control, manage, and accurately predict the optimal performance of these institutions under their available conditions. Initially, diverse data was collected to evaluate the performance of the institutions in the study sample

A user interface was also designed for data entry, model execution, and the generation of automated reports. Figure (1) illustrates the sequence of research steps.
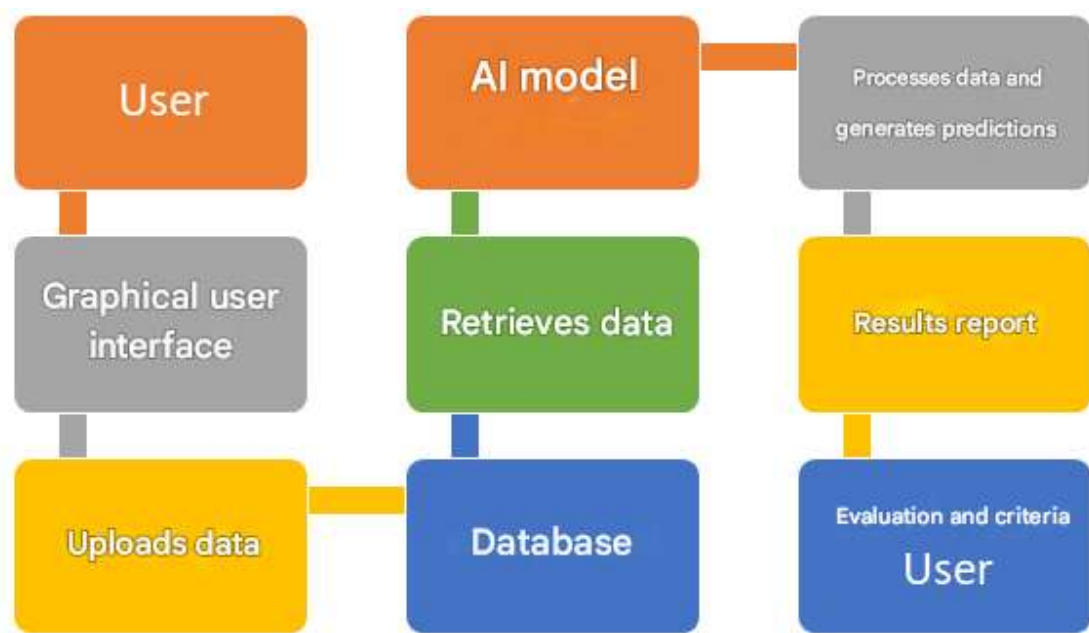
Figure 1. shows the sequence of search steps..

Figure 2. shows the applied structure of the algorithm**.**

The study sample, representing a group of establishments from various sectors—service, manufacturing, and technology—can be summarized in Table (1), which provides a complete overview of the studied sample**.**

Table 1. Details of the Study Sample

Property	Detailed Description
Number of Samples	1000 samples (representative distribution of various organizational cases to ensure comprehensive analysis)
Number of Variables	4 principal variables
Variable Types	- 3 quantitative (numerical) variables: such as financial performance indicators, administrative processes, and time metrics
Cleaning Process	- 1 qualitative (classificatory) variable: such as classification of organizational decision type
Data Transformations	- Records with missing or incomplete values exceeding 10% were deleted
Data Balance Handling	- Outliers were handled by either replacing them with the mean value or removing the affected records
Data Quality	- Numerical values were normalized using Min-Max Scaling to ensure consistency across variables
Analytical Tools	- Qualitative variables were encoded using One-hot Encoding to convert them into a model able numerical format

Below we will review the steps for designing the software process:

1.   Database setup phase

Figure (3) shows the part of the code that performs this process, through which the connection to the database is made to ensure that the data is stored in an organized manner.

```
conn = sqlite3.connect('organization_data.db')
cursor = conn.cursor()
cursor.execute('''
CREATE TABLE IF NOT EXISTS data (
    id INTEGER PRIMARY KEY AUTOINCREMENT,
    feature1 REAL,
    feature2 REAL,
    feature3 REAL,
    target INTEGER
)
''')
conn.commit()
```

Figure 3. Database Setup Phase

2. Data Upload Phase

Figure (4) shows the part of the code that performs this operation ("check-clean")


```
def upload_data():
    filepath = filedialog.askopenfilename(filetypes=[("CSV files", "*.csv")])
    if not filepath:
        return
    try:
        data = pd.read_csv(filepath)
        data = data.dropna()
        required_columns = {'feature1', 'feature2', 'feature3', 'target'}
        if not required_columns.issubset(data.columns):
            messagebox.showerror("خطأ", "ملف CSV يجب أن يحتوي على الأعمدة التالية:
feature1, feature2, feature3, target")
            return
        for _, row in data.iterrows():
            cursor.execute('INSERT INTO data (feature1, feature2, feature3, target)
VALUES (?, ?, ?, ?)',
                       (row['feature1'], row['feature2'], row['feature3'], row['target']))
        conn.commit()
        status_text.insert(END, f'تم رفع البيانات من الملف: {filepath}\n')
    except Exception as e:
        messagebox.showerror("خطأ", f"حدث خطأ أثناء رفع البيانات: {e}")
```

Figure 4. Data Upload Phase

3.   Analysis and Modeling Phase

Figure (5) shows the part of the code that performs this operation, ("Retrieval - Splitting - Analysis - Random Forest Construction - Accuracy Calculation - Report Preparation")


```
def run_analysis():
    def analysis():
        status_text.insert(END, "بدء التحليل...\n")
        df = pd.read_sql_query("SELECT feature1, feature2, feature3, target FROM data", conn)
        if df.empty:
            status_text.insert(END, "لا توجد بيانات كافية للتحليل\n")
            return
        X = df.drop('target', axis=1)
        y = df['target']
        X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
        model = RandomForestClassifier(n_estimators=100, oob_score=True, random_state=42)
        model.fit(X_train, y_train)
        y_pred = model.predict(X_test)
        accuracy = accuracy_score(y_test, y_pred)
        status_text.insert(END, f'دقة نموذج الغابة العشوائية: {accuracy:.2f}\n')

        report = classification_report(y_test, y_pred)
        status_text.insert(END, f'تقرير التصنيف:\n{report}\n')

        feature_importances = model.feature_importances_
        features = X.columns
        importance_text = "أهمية الميزات:\n"
        for feature, importance in zip(features, feature_importances):
            importance_text += f"{feature}: {importance:.4f}\n"
        status_text.insert(END, importance_text)
        with open('report.txt', 'w', encoding='utf-8') as report_file:
            report_file.write(f'دقة النموذج: {accuracy:.2f}\n\n')
            report_file.write('تقرير التصنيف:\n')
            report_file.write(report + "\n")
            report_file.write('أهمية الميزات:\n')
            for feature, importance in zip(features, feature_importances):
                report_file.write(f"{feature}: {importance:.4f}\n")
        status_text.insert(END, 'تم إنشاء التقرير النصي "report.txt"\n')
        status_text.insert(END, "انتهاء التحليل\n")
    threading.Thread(target=analysis).start()
```

Figure 5. Analysis and Modeling Phase

4.   Graphical User Interface (GUI) Setup Phase

Figure (6) shows the code snippet responsible for this.

```
root = Tk()
root.title("نظام إدارة معلومات ذكي بالذكاء الاصطناعي")
Label(root, text="نظام إدارة وتحليل بيانات المؤسسة", font=("Helvetica", 16)).pack(pady=10)
upload_button = Button(root, text="رفع بيانات CSV", command=upload_data, width=20)
upload_button.pack(pady=5)
analyze_button = Button(root, text="تشغيل التحليل وبناء النموذج", command=run_analysis,
width=30)
analyze_button.pack(pady=5)
status_text = Text(root, height=20, width=80)
status_text.pack(pady=10)
scroll = Scrollbar(root, command=status_text.yview)
scroll.pack(side='right', fill='y')
status_text.configure(yscrollcommand=scroll.set)
root.mainloop()
conn.close()
```

Figure 6.Graphical User Interface Preparation Stage

3. Results

The study sample model achieved an accuracy rate of 92% and demonstrated its effectiveness in identifying the factors that most influence performance.

Table (2) shows the performance evaluation of the aforementioned model.

Table 2. Performance Table of the Random Forest Model

Indicator	Value
Accuracy	%92
Out-of-the-Bag Samples	8.9% (OOB score)
Number of Trees	100

When analyzing the features, aspects, and parameters that most significantly influence the organizational process in the study sample, the following was revealed:

- Operational accuracy ranked first, accounting for 32% of the overall importance and a fundamental and urgent necessity.
- The financial situation was significantly affected, at a rate of 25%.
- Sound planning based on solid academic principles plays a crucial role in improving performance and accuracy, ranking third with an 18% score. . This represents the organization's planning position at 18%. Therefore, sound planning based on solid academic principles plays a significant role in improving performance and accuracy in work.
- The fourth position was held by a parameter related to the organization's clients and the efficiency of the services provided to them. This factor or parameter has a positive impact on the organization's success and progress, accounting for 15% of the overall importance.
- The fifth position was held by the parameter of speed of performance and procedural efficiency in business management, as time is of paramount importance in process execution. This parameter accounted for an average of 10% of the overall importance. Table (3) and Figure (7) illustrate the importance percentages for the aforementioned parameters.

Table 3. Importance of features in the model

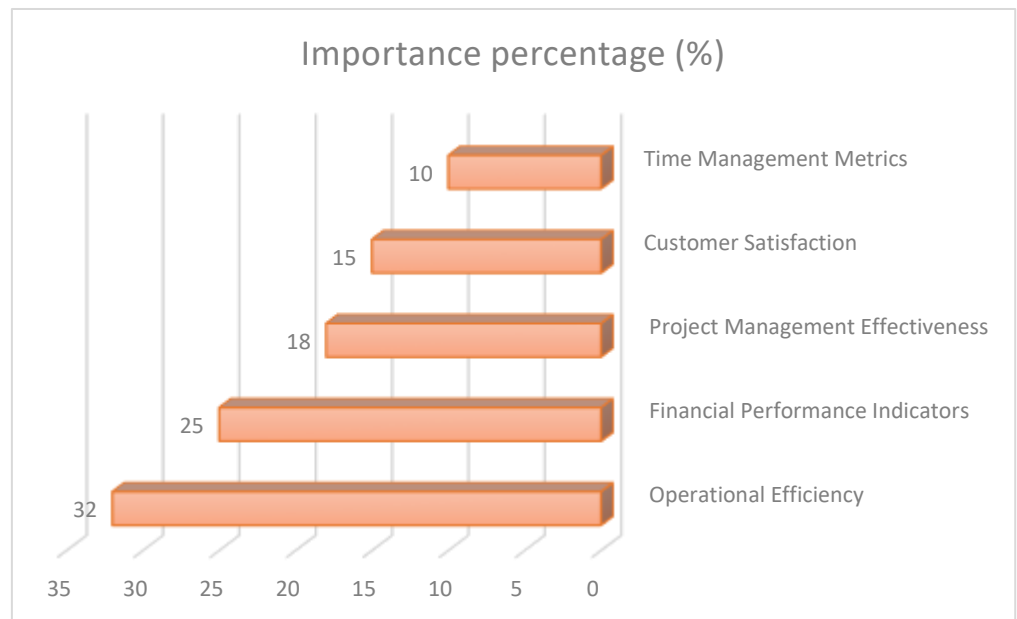| Variable	Importance percentage(%)
Operational Efficiency	32
Financial Performance Indicators	25
Project Management Effectiveness	18
Customer Satisfaction	15
Time Management Metrics	10

Figure (7) The Importance of Features in the Random Forest Model

From Figure (7), we observe that performance efficiency and work accuracy are related to many parameters, primarily operational efficiency, followed by the organization's financial aspects, and then administrative, planning, and service aspects. Working to increase work efficiency in these areas leads to achieving a high level of performance, creating strong competitiveness, achieving the organization's goals, and making the right decision at the right time under the available circumstances.

The algorithm also provides a user interface where the user can easily input their organization's data and obtain the results of analyzing the organization's current situation and future projections through a report. Figure (8) shows this interface, and Figure (9) shows a print-ready report displayed by the results interface.
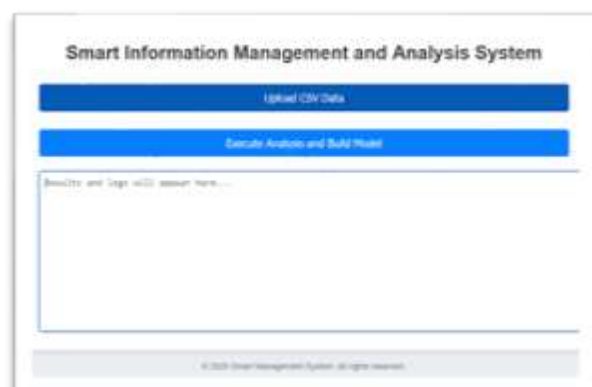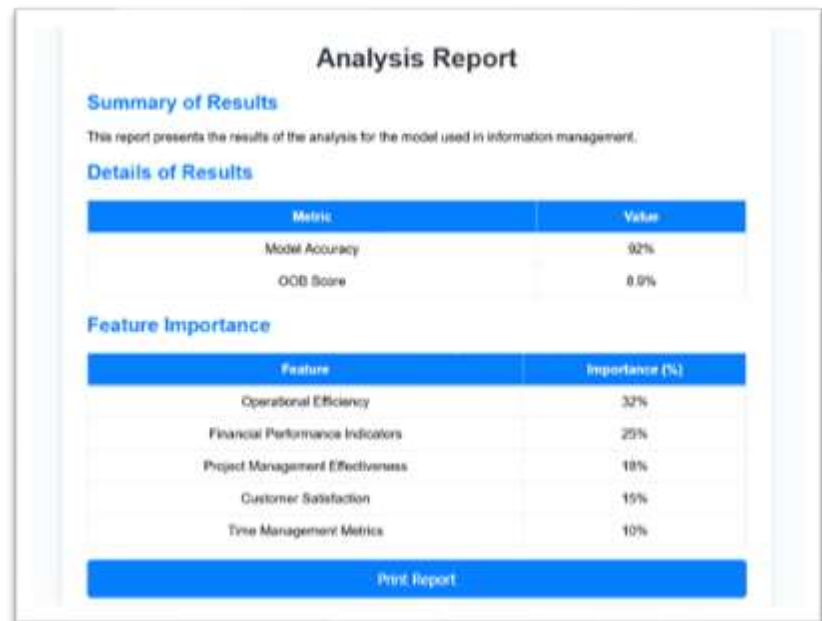
Figure (9) Results Report

The designed algorithm provided many benefits, most importantly, it offered future projections of the studied organization(s). These projections allow for the implementation of specific instructions to improve performance and raise the organization's standards. The algorithm identifies the parameters that most significantly impact performance and provides a user-friendly interface. Users can input data about their organization or facility and receive results based on their input. It also offers the advantage of generating a complete report that can be printed directly. However, some challenges in implementation must be noted, including privacy protection, information security, ethical considerations, and the need to train employees on new methods. The current study concurred with all reference studies that artificial intelligence plays a significant role in influencing and improving job efficiency. It also agreed to some extent with Al Moaiad's study regarding the criteria that somewhat affect productivity. Furthermore, it agreed with Luthfiani et al.'s study (2024) that employees play a significant role in improving efficiency with the use of modern software. Finally, it concurred with Bhima et al.'s study. The study acknowledges some challenges in protecting privacy. It also identifies the necessary procedures for the designed algorithm to achieve its intended purpose, as outlined in the recommendations, which are also referenced in the study by Susanti et al.

4. Conclusion

From the above, we observe that the random forest model, with its approach, achieved high accuracy, and that the designed model successfully fulfilled its intended purpose of providing future performance projections and identifying the most influential parameters.

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