Palestine polytechnic university

College of administrative science and informatics

Project subject:

Auto-Shaping Tool

Team members:

Manar Tomizi

Tahani Mahareq

Wijdan Tomizi

Supervisor:

Dr. Faisal Khamaysh

This project was submitted in partial fulfillment of the requirements for the degree B.Sc.

June, 2011

Aacknowledgment

Personally, we’d like to thank all those who have helped with their advice and efforts …

We’d like also to thank all Palestine polytechnic university staff, especially our supervisor Dr.Faisal khamysehn and Mr. Ausama Dwaik for their valuable advices.

For my parents, friends and everyone, We offer this project.

Dedication

To whom lit the light in our road and made the sun in the darkness, to the best women in the world, to **o**ur **lovely mothers**

To whom gave us hope and power to be stronger, for you:
our **dear fathers**

To the spike of grains and the fruits of the olive:
To whom help and support us: our **teachers**
To our home: **Palestine Polytechnic University**

ملخص:
نتيجة للتقدم التكنولوجي, والتطور المستمر في استخدام الحاسوب في شتى مجالات الحياة وخاصة في مجال الرسم الحاسوبي كان لا بد من تطوير أساليب وأدوات جديدة تنسجم مع هذا التطور, لذلك لقد قمنا ببناء نظام يقوم بتوظيف تقنيات جديدة تسهل على المستخدم عملية الرسم باستخدام الحاسوب بحيث يكون أشبه بالرسم باستخدام الطريقة التقليدية وذلك لأن كثير من المستخدمين يفضلون الرسم باستخدام الورقة والقلم على عملية الرسم باستخدام الحاسوب التي تقوم على عملية اختيار الشكل ومن ثم يتم رسمه بشكل تلقائي.
يقوم هذا المشروع على تمكين المستخدم من رسم بعض الأشكال الهندسية باستخدام الفأرة عن طريق تحريكها للحصول على الشكل الهندسي كما لو انه يحرك القلم على الورقة ثم يقوم النظام بتحويل الشكل الذي تم رسمه بطريقة عشوائية إلى شكل منتظم .
هذا النظام سيأخذ بعين الاعتبار مجموعة من الأشكال الهندسية فقط, سيأخذ مجموعه الأشكال الكافية **لرسم** مخطط انسيابي.

Abstract:

As a result of the technological progress and development in the use of computers in all aspects of our life, especially in the field of computer graphics, it is becoming very important to develop new methods and tools that are consistent with this development. We are going to build a system to make the drawing process through computer more easier for the user. This application enables drawing with computer become closer to the traditional approach in drawing.

The project aims to enable the user to draw some geometric shapes using the mouse by manually. The main function of the system is to convert the hand-sketched shapes to its closer regular shape.

And this application, we have considered the flowchart symbols including circle, arrow, rectangular…etc.

Table of contents

Table of tables:

Table of figures:

Chapter One

Introduction

Introduction

Problem Statement

Objectives

Schedule

Gant Chart

Summary

1.1 Introduction:

Computer graphics is one of the most interesting and rapidly growing fields in the computer science. Some of the most sophisticated computer systems in use today are designed in the field of computer graphics; most of these systems are tending to make things easier for the user.

1.2 Problem statement:

Most of computer users nowadays use the computer to draw shapes in different situations. e.g.(flowchart). The drawing through computer is performed by the drag and drop process which considered uncomfortable. As users used to draw shapes using pen, they sometimes face problem in drawing with drag and drop process. The users need a new drawing tool that enables them to draw more freely and comfortable that are closer to the traditional approach (using paper and pen).

This project enables the user to draw shapes manually using mouse. In this project we are going to build a drawing tool that can be used to draw some shapes manually like (circle, rectangle, square, ellipse). The tool will convert the user hand-sketched shapes to the most suitable uniform one.

1.3 Objectives:

The main purpose for this project is to develop a drawing tool that is:

- Enabling users to draw manually.
- Enabling users to draw shapes or full flowcharts in faster and easier way.
- Simplify the drawing operation for the user.

1.4 Project team:

The project team constructed of three students, the team used to work together in each phase to handle all activities.

1.5 Schedule:

This section shows the expected time needed for every stage in the system development life cycle (SDLC) . The table below represents the work schedule:

Task number	*Task name*	*Expected time needed*
1	System palming	**6 weeks**
2	System analysis	**6 weeks**
3	System design	**6 weeks**
4	System implementation	**8 weeks**
5	Testing	**2 weeks**
6	System documentation	**All over the SDLC**

Table (1.1) Expected duration time for system development stages

1.6 The flow of development stages:

This chart represents the expected and actual time needed for every stage in the SDLC.

Weeks / stage	2	4	6	8	10	12	14	16	18	20	22	24
System planning												
System analysis												
System design												
implementation												
Testing												
documentation												

Table (1.2) Gant Chart

Expected time

Actual time

1.7 Summary:

This chapter highlights the problem statement of the system, the main objectives of the system , expected time schedule and the flow of the system development stages using Gant Chart.

Chapter Two

Planning

Introduction

Alternatives

Functional Requirement:

Non-functional Requirements

Limitations And Constraints

Feasibility Study

Summary

2.1 Introduction:

In thischapter we willexplaining the system planandall resourcesthat areneeded, also constraints andrisksthatwillface, as well as alternativesand feasibility study, as theinitial stagein thedevelopment ofthe systemwhere thescheduleincludesa fullsystem resourcesand thecosts ofits construction.

2.1 Alternatives:

Initially, the following alternatives are proposed to be followed as an application.

A) An Artificial Inelegance (AI) which follows the AI principles to detecting and transforming shapes
B) An Image processing application which mainly uses image processing in detecting and transforming shapes.

And we will discuss the two alternatives to choose the most suitable one:

A) Artificial Inelegance (AI):

The ability of a computer or other machine to perform those activities that are normally thought to require intelligence or branch of computer science concerned with the development of machines having this ability.[1]

Advantages:

- The system consider to think rationally regardless the way of doing it.[5]
- Self-learning.

Disadvantages:

- This algorithm is usually complicated and so needs some high skills to program it.

B) Image processing techniques:

A technique in which the data from an image are digitized and various mathematical operations are applied to the data, generally with a digital computer, in order to create an enhanced image that is more useful or pleasing to a human observer, or to perform some of the interpretation and recognition tasks usually performed by humans. Also known as picture processing.[8]

Advantages:

- The required code is more simple in comparison with AI algorithms.

- The project development team is capable of programming Image processing rather than dealing with AI.

Disadvantages:

-Difficult to build the base shape-images and their properties to be used in detecting and transformation.

The proposed system:

After reviewing and analyzing the properties of each alternative, we found that the second alternative is suitable to be developed within our abilities and time constraint.

2.2 Functional requirement:

The system have just one user who is the one will draw shapes and manipulate them, thus all functional requirement will be related to perform the user work.

The system has many functional requirements as listed below:

1. The user should be able to draw shapes with the mouse.
2. System converts the user hand sketched drawings to systematic shapes.
3. User can manipulate the shapes such as change properties, and include texts.
4. Enable to import file and export(open and save files).

2.3. Non-functional requirements:

1. The system should be user friendly and aesthetically pleasing, simple, appropriately designed for standard software.
2. System instructions are easy to understand, abstract but clear.
3. A ‘help’ section should be available, to assist users when usage difficulties are faced, if the users do not have enough knowledge to use the program. Additional assistance should be displayed where necessary.

2.4 Limitations and constraints:

1. The probability of new requirement to appear after the system building.
2. Time constraint, which is the team need more time to analyzing and developing the system.

2.5 Feasibility Study:

In this section we divided the total cost of this project in two parts: Performance cost and operational cost to develop this project.

2.5.1 System Development Resources:

In this section we include the resources used to develop the system, dividing them to physical, programming and human resources.

2.5.1.1 Physical Development Resources:

This table shows the physical development resources for the project:

Physical component	number	Specifications.
Computer device	1	Memory (2 GB at least). Hard disk (20 GB). Modem (56 KB). Screen. Keyboard, mouse.
Flash memory	1	2 GB

Table (2.1)Physical development resources.

2.5.1.2 Programming Development Resources:

1- Microsoft Windows 7.
2- Microsoft Visual Studio.Net 2005.

2.5.1.3 Human Development Resources:

The team Includes three members. The main responsibilities are reviewing previous studies, analysis, develop the system.

2.6.2 System operating resources:

In this section we will show the expected physical, programming and human operating resources. These resources are needed after the system installation process.

2.6.2.1 Physical Operating Resources:

physical component	Specification
Computer device	Memory (2 GB at least). Hard disk (20 GB). Screen. Keyboard, mouse

Table (2.2) Physical operating resources

2.6.2.2. Programming Operating Resources:

1- Microsoft Windows 7,vista or XP
2- Visual studio 2005.

2.6.2.3. Human Operating Resources:

1- Supervisor of the system they perform maintenance to the system.
2- User of the system to drawing there shapes using the system.

2.6.3. The Expected Cost Of the System:

In this section we will explain the expected costs for the system, including physical, programming and human resources.

2.6.3.1. System Development Cost:

This section contains the expected development cost for the system. These costs include the cost of physical, programming and human recourses needed throw SDLC.

2.6.3.1.1. The expected physical cost of the system:

This table show the expected physical cost of the system:

Physical component	Specifications.	Cost
Computer device	Memory (2 GB at least). Hard disk (20 GB). Modem (56 KB). Screen.	500$

	Keyboard, mouse.	
Flash memory	2 GB	16$
Total		516$

Chapter (2.3)The expected physical cost of the system[2]

2.6.3.1.2. The expected programming cost of the system:

This table show expected programming cost of the system:

Programming component	**Cost**
Microsoft Windows 7.	299$
Visual studio 2005.	200$

Table (2.4) The expected programming cost of the system [4]

2.6.3.1.3. The expected cost for human resources**:**

This table shows the expected cost for human resources:

Human component	**Hour/week**	**Cost/hour**	**Total/week**
3	25	10$	750$

Table (2.5) the expected cost for human resources

-The total cost of human in 15 week:

750$ * 15 = 11250 $.

-The total cost of human in one month:

750$ * 4 (week) = 3000$.

- **The total cost expected to develop the system:**

Physical cost	Programming cost	Total/month
516$	499$	1015$

Table (2.6)The total cost expected to develop the system

Total development cost in 8 months:

Human cost+ Physical cost+ Programming cost

300$+516$ +499$=4015$

2.7. Risks and risks analysis:

All systems face many risks in their development process due to many threats and limitation.

In the development of our system we faced many risks as listed below:

- Time, the main problem we have is there is limited time period.
- Requirement collection and analysis because the tool are developed for general users.
- No deep knowledge of the system idea, and lack of development team experience in such projects.

2.8. Proposed solutions:

- To solve the problem we face with time we make a plan for developing the system. In the plan we specify expected time needed for each stage in the SDLC.
- To solve the problem of collecting requirement we ask different possible user about what they want to have in the drawing tool.
- To cover the problem of lack experience, the project team return to many relevant scientific papers and search internet sites for related information and application.

2.9. Summary:

This chapter highlight the alternatives, functional requirement of the system, nonfunctional requirement, and risks that we have face during the system development, and we suggest some solution for this risks, we also explain the feasibility study and cost for the system.

Chapter Three

Analysis

Introduction

Functional Requirement Description

Context Diagram

Data Flow Diagram

Test Plan

Summary

3.1 Introduction:

Theprocess of gathering information and requirements about the system to perform the analysis is very important, and it's the stage that defines how to work in all following stages.Analysis should be must bedonebefore we startbuildingthe system because it will define what to build and how to build the system. At thisstagewe willanalyze thesystem requirements includingfunctionaland nonfunctional requirementsanddeterminetheir relationships with thesystem environmentindetails.

3.2 Functional requirement description:

- The user draw the shapes with the mouse :

Task	Drawing shapes
Description	The user can draw shapes by moving the mouse with the hand
Inputs	Mouse movements
Source	Continuous clicks on the mouse
Outputs	User's draw nonsystematic shapes
Purpose	Enable the user to draw shapes in a much comfortable way
Requirements	The user should be in the system home page
Before execution condition	User should be in the system home page
After execution condition	The user drawings
Actions	The user start drawing by putting the mouse in the white space uses for drawing in the home page and start moving the mouse to draw the wanted shape like he draw with a pen on a paper

- The system should convert the user drawings to systematic shapes

Task	Convert user drawings into systematic shapes
Description	The system will convert the shapes drawn by the user with mouse into systematic shapes
Inputs	User drawing
Source	Home page
Outputs	systematic shape

Purpose	Have a systematic shapes in a much easier way to the user
Requirements	User must draw a shape with the mouse
Before execution condition	User's drawings
After execution condition	Systematic shapes
Actions	The system take the user's hand drawings and convert them to the nearest systematic shape in the database according to the conversion algorithm

- The user should be able to change brush color

Task	Change color
Description	The user can change the color of the brush
Inputs	the wanted color
Source	The system color palette
Outputs	The chosen color
Purpose	Enable the user to use the needed or preferred color for more comfortable in using the system
Before execution condition	The old color for the brush
After execution condition	The new color for the brush
Actions	The user pick the brush icon to draw and then go to system plat to choose the wanted color by clicking on it

- The user can add text to any place in the drawing space

Task	Add text
Description	The user can add a text
Actions	The user can put the mouse in any place and in inside any shape and when click the right button a list will show to allow him to add a textbox, he just click on it.

- The user should be able to resize the shapes

Task	Resize the shape
Description	The user can resize any shape
Actions	The user can put the mouse on the shape and start

	resizing it

- The user can delete the shapes

Task	Delete shape
Description	The user can delete any shape
Actions	The user can put the mouse on the shape and click right button to choose to delete it.

3.3 Context diagram:

This diagram specifies the basic relationship between the system and their environment. The main actor of our system is user, the system allow the user to draw hand sketched then the system recognize the drawing shape and transform it to uniform shape.

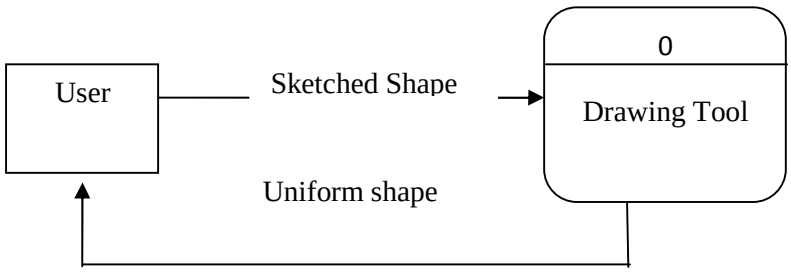


Figure (3.1) context diagram

3.3 Data flow diagram:

This diagram shows the shows the basic function that user performs in this system, and how the system deal with:

- User draws the needed shape using mouse on the white space in the system.
- The system process the shape that drawn by the user (algorithm).
- The system returns uniform or systematic shape to user.
- If the user want to add text to shape, then right click on it and select add text from the menu.
- The system allows the user to add text.

- If the user wants to change the color of the shape, then select the preferable color from the color palette, and then save the shapes that draw.

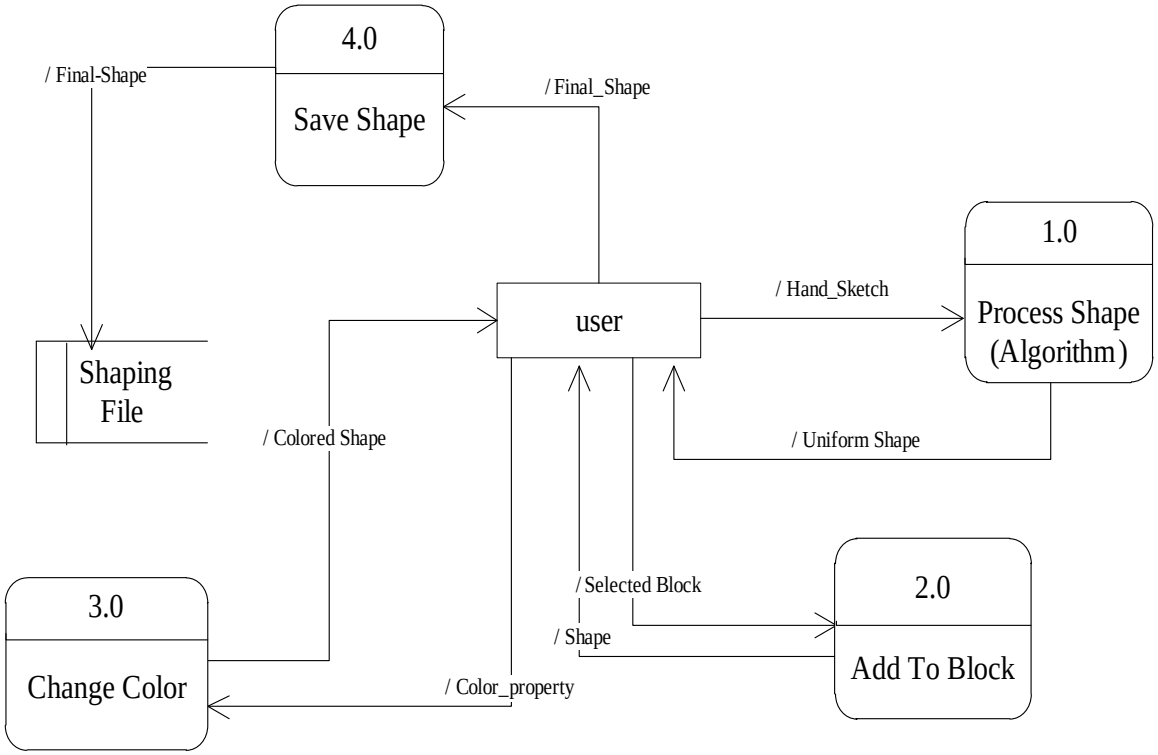


Figure (3.2) data flow diagram

3.4 Test Plan:

This document is a test plan for the Auto-Shaping Tool system. It describes the testing strategy and approach to testing this project will use to validate the quality of this product prior to release. It also contains various resources required for the successful completion of this project. The focus of the Auto-Shaping Tool is to support those new features that will allow easier development, deployment and maintenance of solutions built upon the system.

Those features include:

The following is a list of the areas to be focused on during testing of the application:

A)Tests the recognition process.

B)Test the whole system.

C)Test the system acceptance.

3.5. Summary:

This chapter highlights functional requirement of the system in details, and draw the context diagram , data flow diagram(DFD), and we set a test plan for the system.

Chapter Four

Design

Introduction

System Interface

Pseudo code

Algorithms

Summary

4.1 Introduction:

In this section we will describe the system design that includes pseudo code, the algorithm of system and the interface this chapter include:

UML Diagrams:

- System Interface
- Pseudo code
- Algorithm

4.2 System Interface Design:

This system consist of one interface which is the start page that enables the user to draw basic shapes of flowchart and then converts each shape to a uniform one.

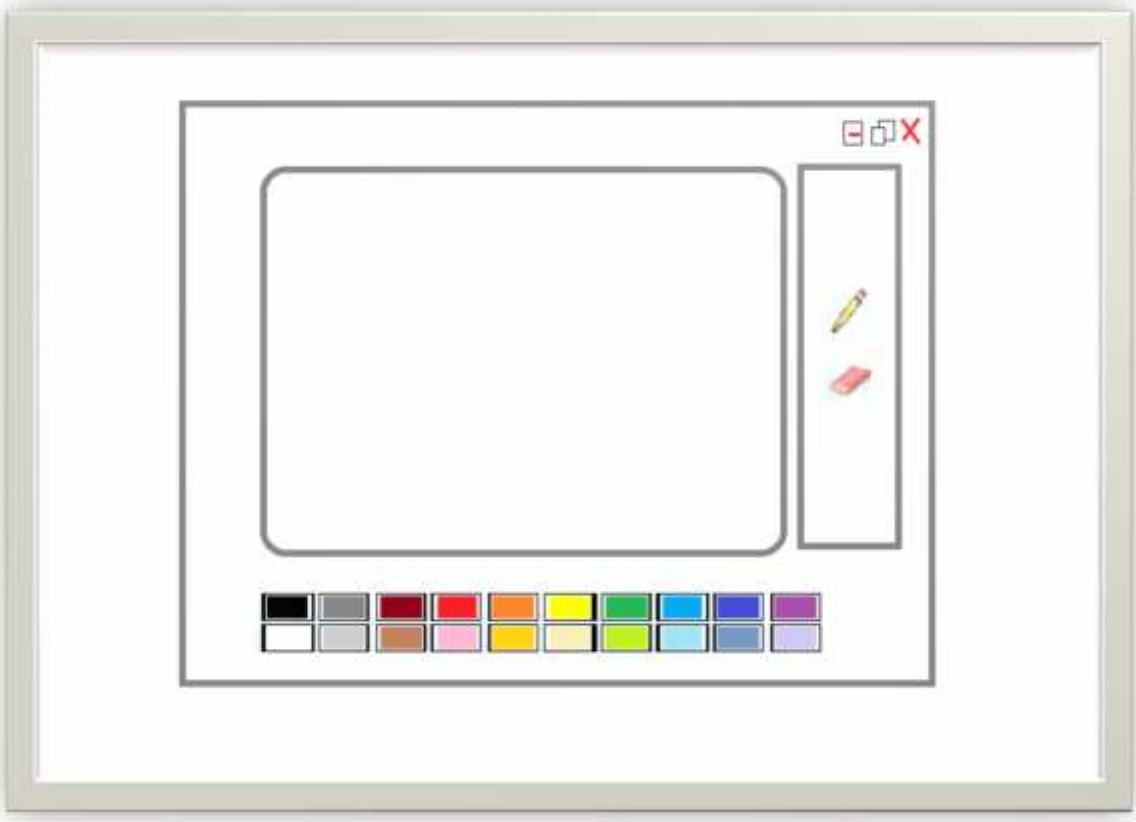


Figure (4.1)Interface design

4.3 Pseudo code:

- Open the system.
- Click mouse down and draw a shape.
- When mouse up.
- Save mouse movement to bitmap image
- Start the algorithm to extract features by scanning the image line by line to define number of ones in each line, the location of ones and how they are related then:

✓ Check the line module
Vertical line : if few ones in first few lines, and relatively much ones below at the same X axis values in the following lines.
Horizontal line : ones are just at the same or close y axis
Else

✓ Check the lozenge module
if few ones in first few lines, and in the next following lines when y increases x increase in a relatively small degree.
Else

✓ Check circle module else
if few ones in first few lines, and in the next following lines when y increases x increase in a relatively high degree
Else

✓ Check for rectangle
if relatively a lot of ones in first few lines, and in the following lines ones are at the edges and continue at the same or near x values.
Else

✓ Check for Cuboid
if relatively a lot of ones in first few lines, and in the following lines when y increases x values are shifting to the left.

- Redraw the recognized shape with the features being extracted in the same place and size.

4.4 Algorithm:

the algorithm we used in the system is developed by the project team and don't reuse any external algorithm. The algorithm is simple and efficient for basic shapes. As the

algorithm is new, the project team start coding form zero and don’t use reusable components.

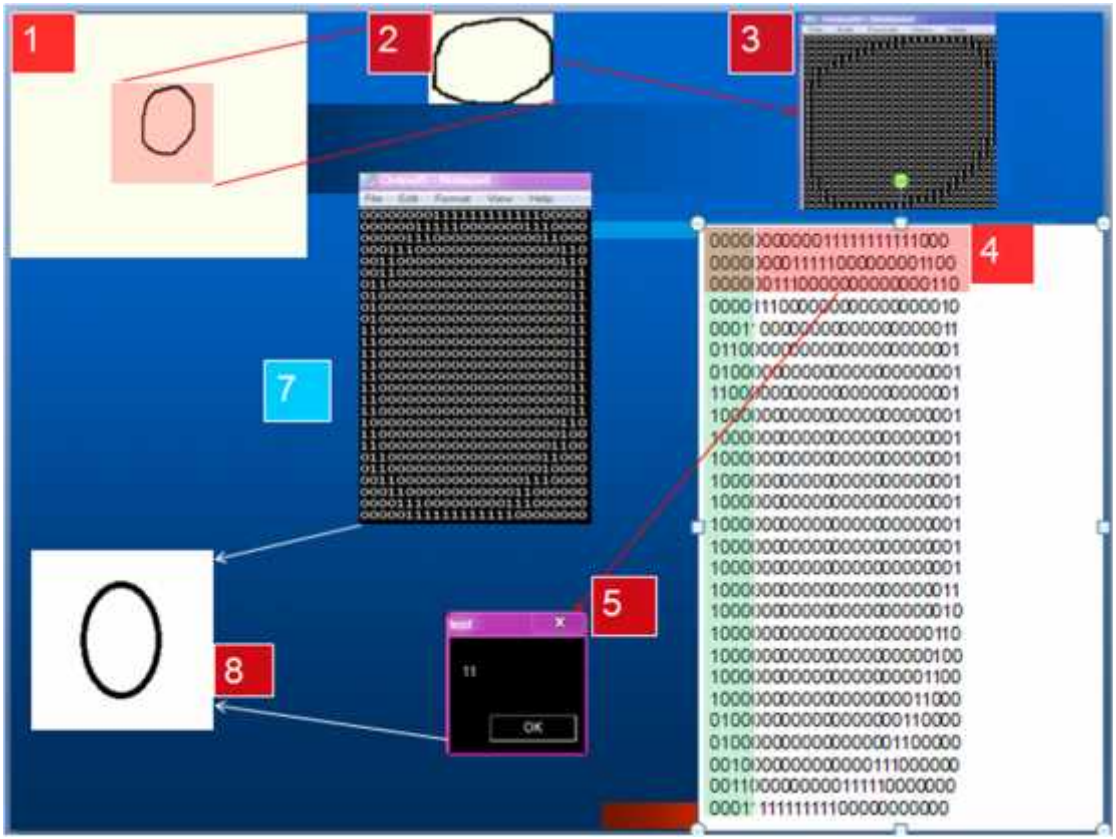
The aim of the algorithm :

The aim of this algorithm is to recognize the hand-sketched shapes drawn by the user. The main goal is to enable shape recognition in real time ; as soon as the user draw the shape the system recognize it.

It describes the core process of the system

Features of the algorithm:

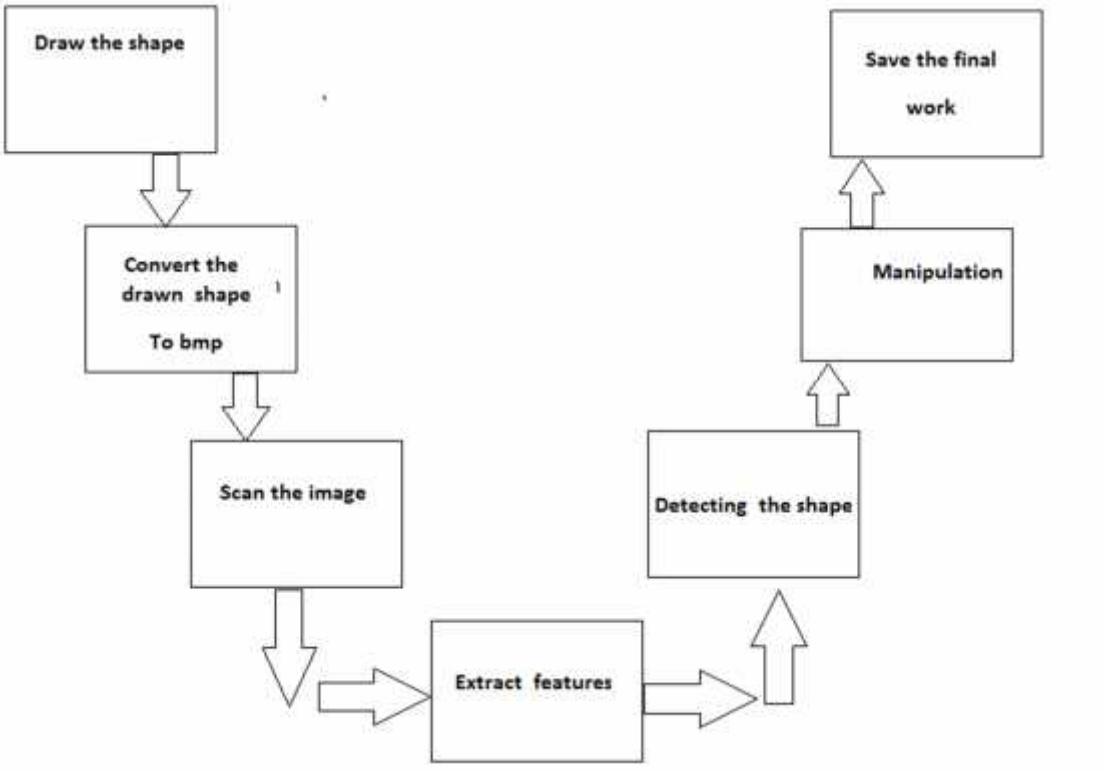
- Real time recognition: in our tool we considered recognizing each shape directly after the user draws it. The user doesn't need to finish drawing all the shapes and wait for recognition to begin.
- A fast recognition process : the algorithm is simple and effective it doesn’t use a lot of computations. It starts checking the most possible near shapes, not all the shapes, and start excluding the not possible shapes so that we don’t check them again and again.



Figure(4.2) algorithm steps

How the algorithm works :

- ✓ The algorithm depends on tracing the mouse movements
- ✓ Every new mouse click indicates a new shape will start
- ✓ The algorithm traces the mouse movement, recording it into an array
- ✓ When click mouse up, directly the algorithm starts checking the array's values to recognize the shape
- ✓ Finally the algorithm redraw the shape depends on the recognition process and the main features of the shape.



Figure(4.3) Detection algorithm

4.5 Summary:

This chapter highlights the UML diagrams that includes pseudo code, system interface and the algorithm used for shape recognition.

Chapter five

Implementation and testing

Introduction

Requirements

Check The Recognition process

Checking The System

Checking the Acceptance Of the System

Summary

5.1 Introduction

This chapter discusses the implementation phase and testing at which more technical details of this project and physical equipment's. Also explain the environment for essential programs that are required for developing and implementing the system.

After finishingprogramming,the systemis placedundertesting and checkingtomake surethatthe system performs its job. The importance ofcheckingis to verifythe reliabilityof each unit andpartof thesystemalone and then for the whole system and also user acceptance to the system.

5.2 Requirements

To complete the project a collection of software and equipment's were used. These include the following:

5.2.1 Microsoft Windows 7:

Windows 7 is the latest operating system from Microsoft and it supports wide range of requirements needed in our project. As Microsoft Visual Studio is used as the developing tool for the project, a supporting platform must be used, and Windows 7 is the best choice.

5.2.2 Microsoft Visual Studio 2005:

Microsoft Visual Studio is an Integrated Development Environment (IDE) from Microsoft. It is a complete development environment where we can do the development and the user interface. The system find out where the mistakes are and correct them. Net. It also supports a variety of programming languages used to develop both desktop and web .Net applications.

5.2.3 Microsoft VB.NET:

Visual Basic .NET (VB.NET) is an Object-Oriented computer language that can be viewed as an evolution of Microsoft’s Visual Basic (VB) implemented on the Microsoft .NET framework .Visual Basic .NET (VB.NET) is an Object-Oriented language .[6]

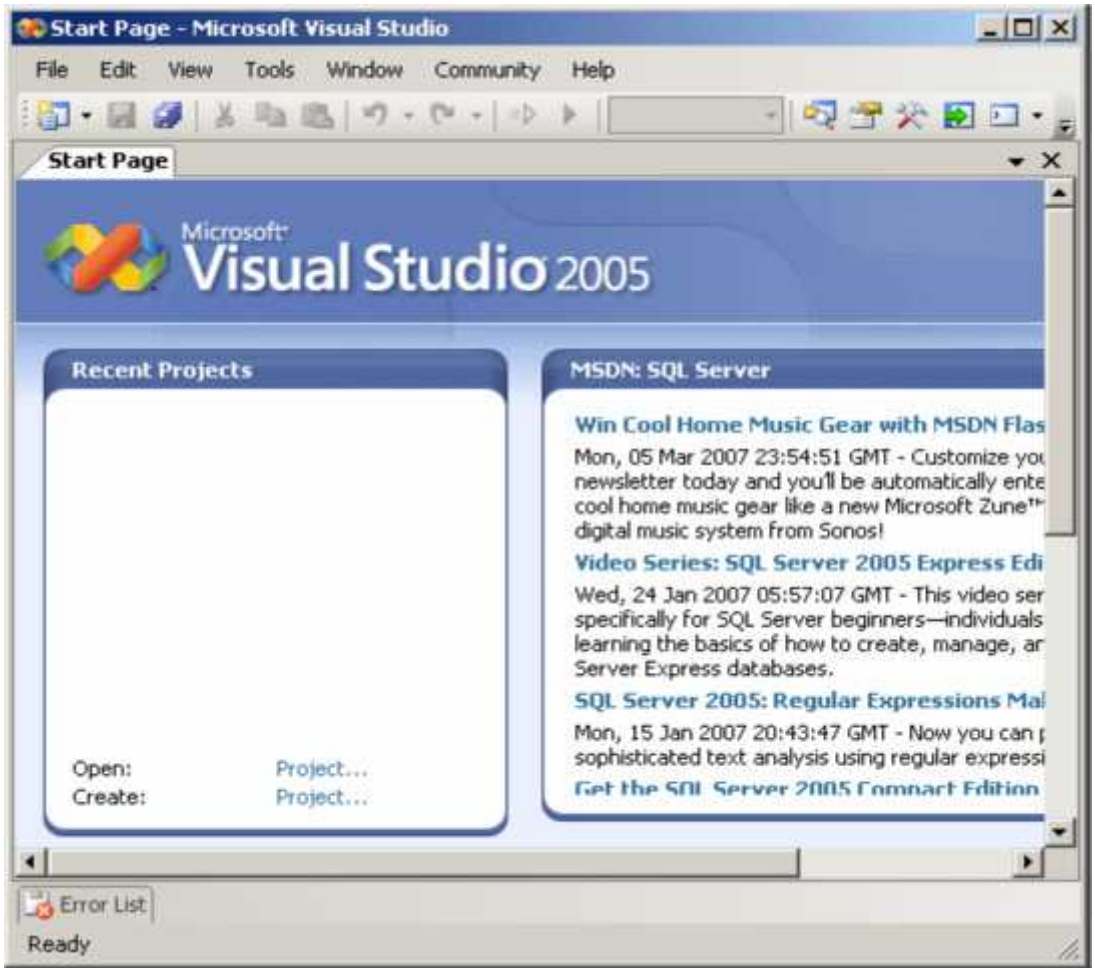


Figure (5-1) Microsoft visual studio.

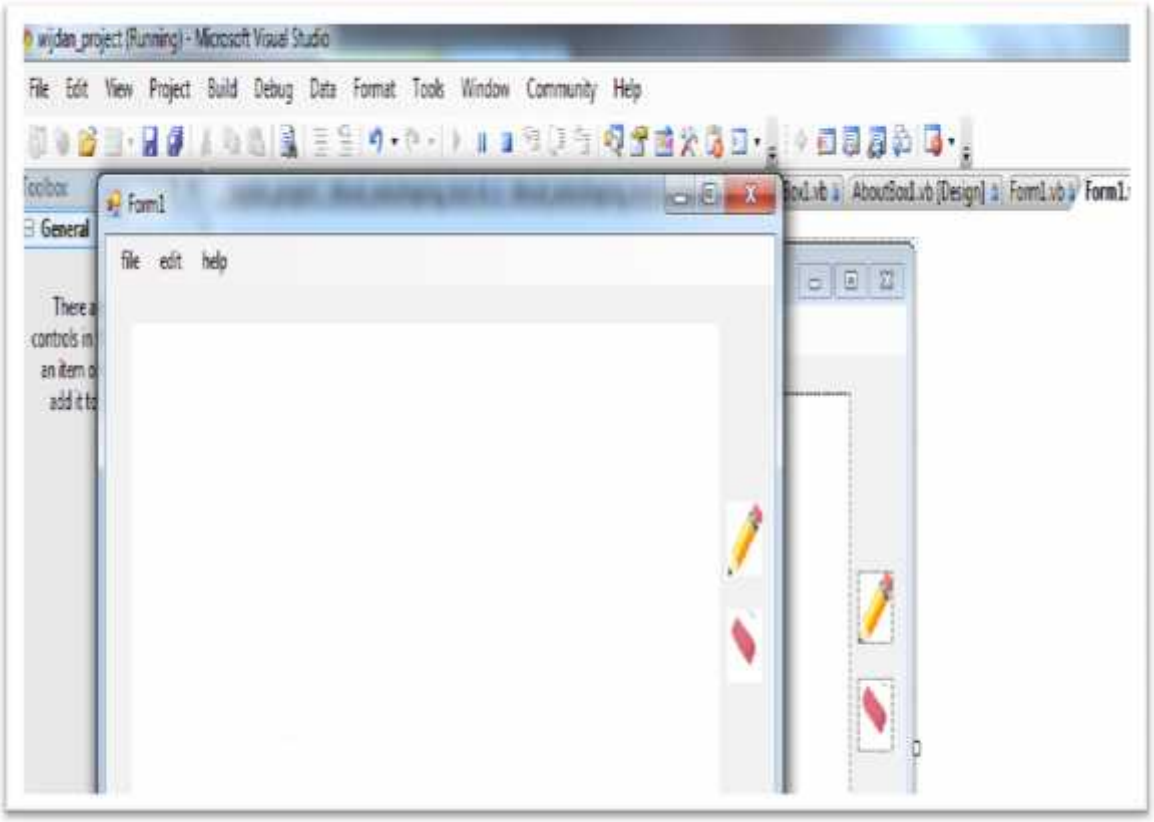


Figure (5-2) start page.

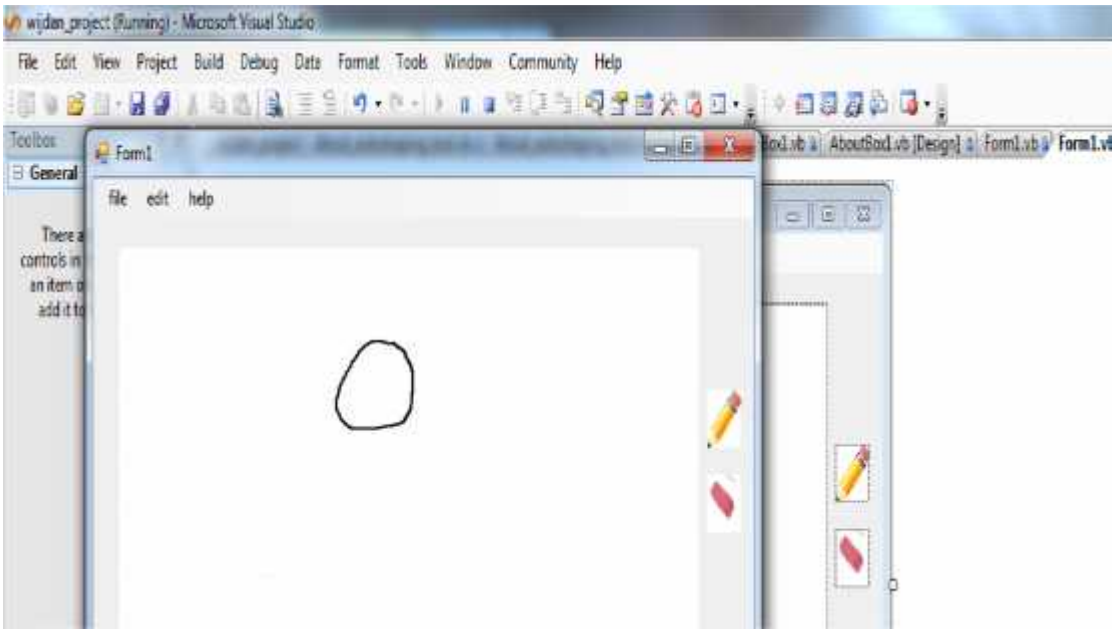


Figure (5-3) drawing a circle.

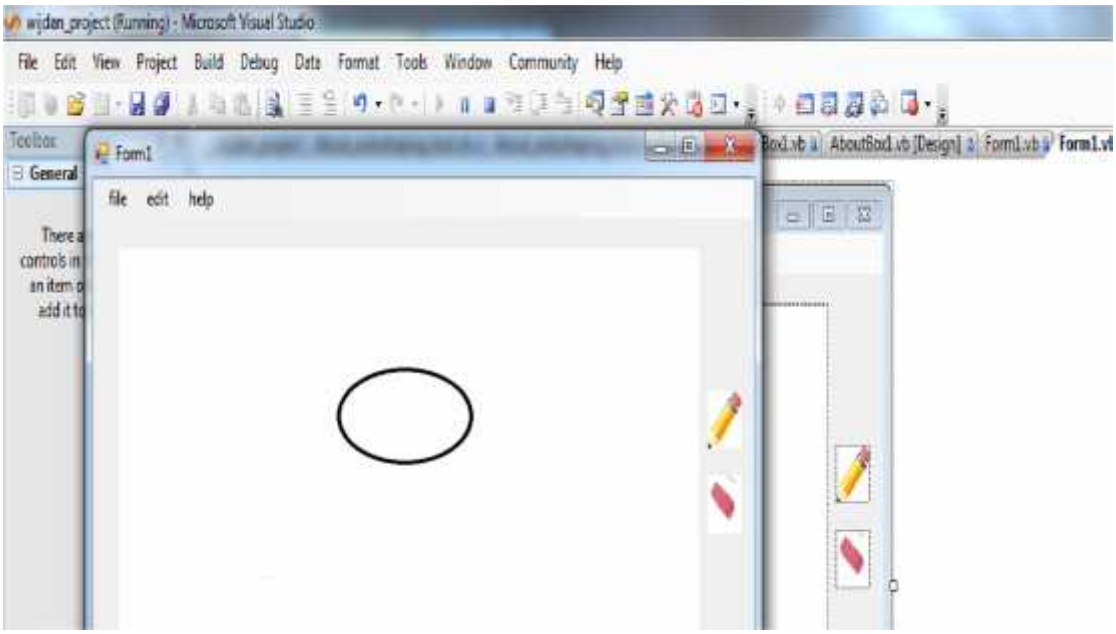


Figure (5-4) After recognition-circle

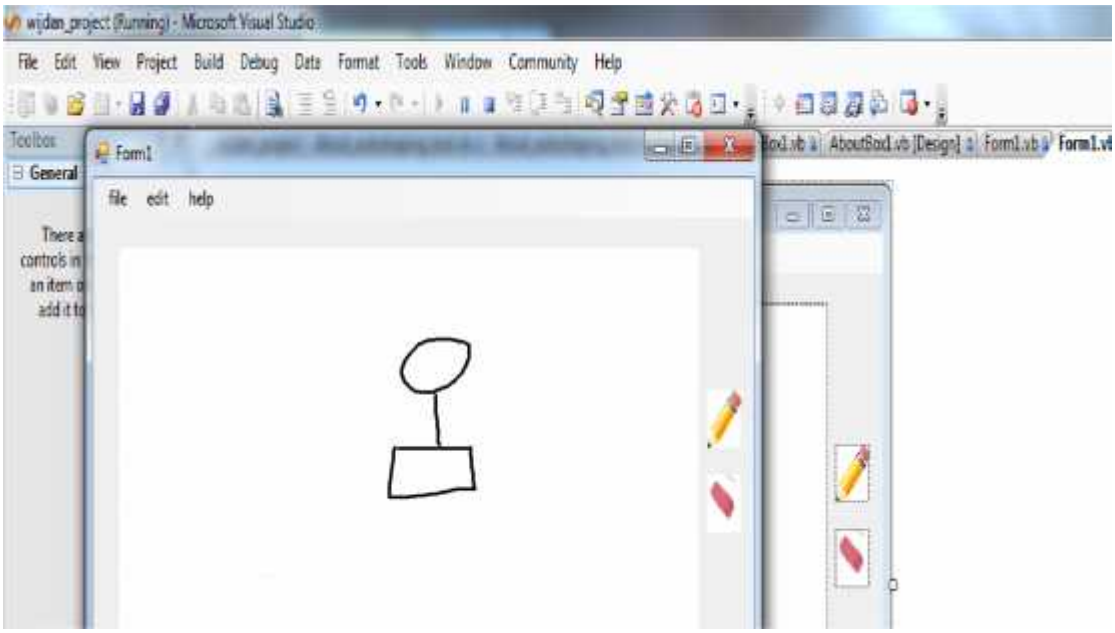


Figure (5-5) Drawing a flow chart

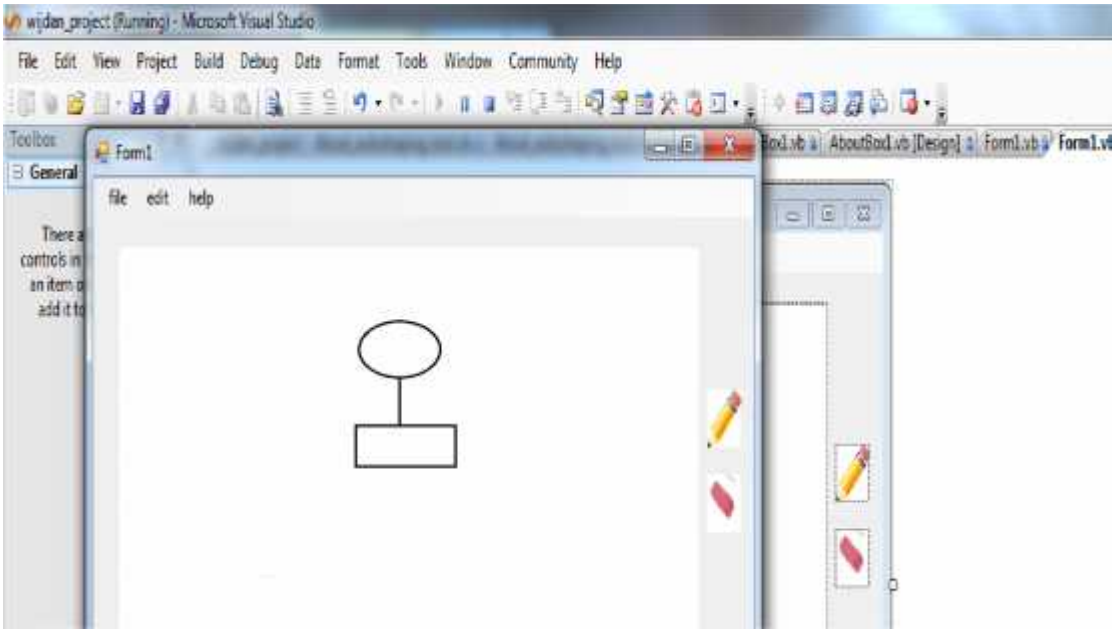


Figure (5-6) After recognition-flow chart

5.3 Checking The Recognition process:

In this stage we will discuss the recognition process in the system to ensure that the system performs this process correctly. The system will be able to recognize only simple geometric shapes and the combinations of them.
Recognition process in the system is in real time, very efficient ;with simple shape recognized within 4 mille-seconds.

We have carried out two evaluations of the recognition process : a survey of 2 experienced designers who used to draw flowcharts to gain subjective feedback on the tool suitability for software design. The second a Cognitive evaluation to gauge its performance characteristics. The accuracy of the shape recognition component we have got as shown in Table.

shape	**Recognition rate**
arrow	**100%**
circle	**80%**
rectangle	**80%**
Lozenge	**80%**
Cuboid	**70%**

(Table 5.1) shapes Recognition rate

As shown in this analysis that some shapes are more distinctive than others, resulting in higher recognition rates ; for example the arrows

Also, the system is enable to recognized partial occluded shapes in most cases

5.4 Checking The System:

Aftercollectingthe system components which responsible to recognize each shape, andtestthem, we foundthatthe systemgives avery good results. The system have fewer errorsingiving theresults, such as recognized hand drawing shapes and then convert it to systematic shapes that match it, have exceeded80%. Butthere weresomeproblemsthat have emerged,such aswhen the user draw a not complete shape for example:(semicircle) then the system may not be able to recognize the correct shape.

5.5 Checking the Acceptance Of the System:

When some students view the system, interact with and test it, we found that the system is acceptable as its simple and easy to use. After asking students who have tested the system, we found that the rate of satisfaction with the system is good, with some observations.Results of the acceptance and usability evaluation are still being Analyzed ,but the feedback provided by our users indicates the following general characteristics of the system:

- Good feedback is provided to the users as after finishing the shape, its directly recognized
- The GUI follows a user friendly design .
- The system is easy to learn and intuitive .
-

5.6 Summary:

Thischapterhighlightsthe practical side ofthe stage ofsystem implementation, defines theresourcesand equipmentneededforprogramming . It also contains testing that include: checking the system recognition process, checking the system and user acceptance .

Chapter six

maintenance

Introduction

Preparing the environment

Maintenance plan

Backup

Upgrade

Summary

6.1 Introduction:

Program maintenance is the updating of application programs in order to meet changing information requirements, such as adding new functions and changing data formats. It also includes fixing bugs and adapting the software to new hardware devices.[7]

It considered the final stage of the system devolvement life cycle (SDLC). In this stage the system becomes ready to work in the real environment ,but there are many requirements and changes must be done on the environment to ensure that the system deployment will be done correctly

6.2 Preparing the environment:

We should prepare the environment and ensure the availability of the basic requirements for the system and they are work in a good an effective manner before deploying the new system.

6.3 Maintenance plan:

As the system working and may face exceptional situation that can cause a system failure , we should prepare maintenance plane that could help users to recover the system and restore their data. This plan includes:

6.3.1 Backup:

In system backup we should carry out a periodic storing to the system and its data to an offline media

This backup image can be used to recover system failure , or when facing any problem of losing the system like theft or any natural disaster.

6.3.2 Upgrade:

Replacement of a product with a newer version of the same product. So when upgrading the system we add new features or components and that may issue some compatibility problems . also we may upgrade the system environment and that will probably need some changes. Changes to the system must be done by experts to avoid making things worse

6.4 Summary:

In this chapter we discuss the system maintenance, what is maintenance, how to maintain the system throw putting a maintenance plan

Chapter seven

conclusions and suggestions

Introduction

conclusions

Delimiters

Recommendations

Summary

7.1 introduction:

After the completion of the process of developing the system (Auto shaping Tool) the team found that the project achieved most of the goals successfully ,by introducing new techniques in drawing shapes. the project team has reached a set of recommendations that would lead to some improvement to the system and increase its efficiency in the future .

7. 2 conclusion

1. developing the system using vb.net to enable the user to draw charts and shapes in an easy way, which keeps the drawing process fun and interactive.
2. The recognition rate is acceptable and done in the real time.
3. Introduction of new drawing tool that can be add to many modeling applications.

7. 3 Delimiters

There are some constraints and difficulties that face the team through the system developing as the following:

1. Difficult to deal with drawing complex chart or other symbol.
2. The difficulty of applying the system on non-windows operating systems such as (Unix).
3. Sometimes appear some problems while identifying the movement of the mouse , where the system requires that the mouse movement is continue until it is finish the drawing .
4. There were some errors occurred during the developing of the system, these errors sometimes mouse motion capturing, and sometimes the algorithm can't identify the write shape.

7.4Recommendations

1. Make the work needed to enable the system to work in other operating systems .
2. Reducing the errors that appear during the recognition .
3. Improving performance so that it becomes faster and more accurate.
4. Using new techniques to make the drawing process more intuitive such as pen and touch screen .

5. the recognition more complicated shapes not only the basics.

7.5 Summary

In this chapter we list the results of building the system, the difficulties and limitations that we faced, and then highlights some recommendations that will make the system more efficient .and can be done as a future work.

References:

Book:

1)StuartJ.Russell&PeterNorvig,(2010),modernApproachToArtificial Intelligence,3/ed.

Paper:

2)-I. A. Ismail1,et-al., 2009,(p.161).

Conference:

3)-Laveen N. Kanal1992. On pattern, categories, and alternate realities. North-Holland: 11th International Conference on Pattern Recognition August 31 -September 3, 1992.

Websites:

4) http://www.Amazon.com, 22/11/2010, Mon ,4:30 pm.

5) http://library.thinkquest.org/2705/approaches.html 24/12/2010,Fri,8:30 pm.

6)http://media.visualparadigm.com/media/documents/dbva40npg/pdf/dbva_dotnet_programmer_guide_chapter7.pdf 31/5/2011,Tue,10:30 pm

7)http://www.pcmag.com/encyclopedia_term/0,2542,t=maintenance&i=46542,00.asp

*8)*http://encyclopedia2.thefreedictionary.com/image+processing **,***2/6/2011,Thr,11:30 am.*

Table of contents

Chapter four
page

Chapter five
page

Chapter six
page

Chapter seven
page