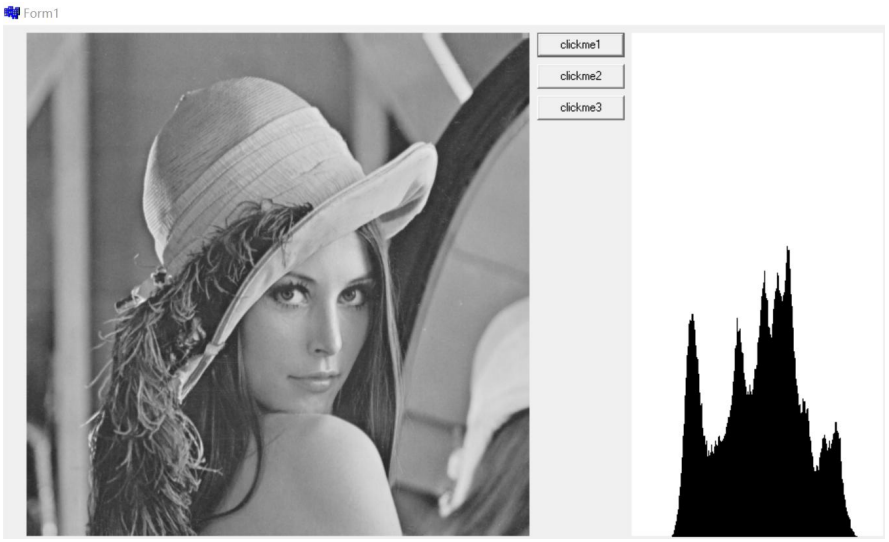
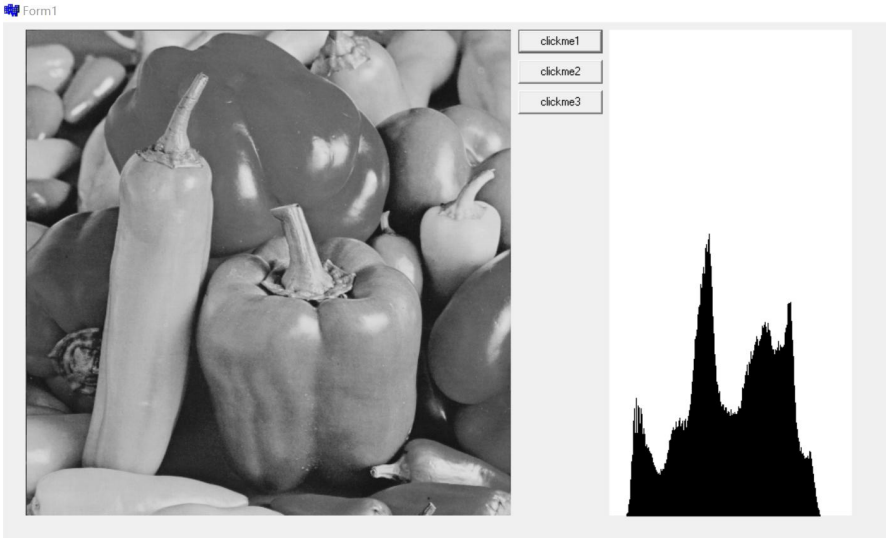
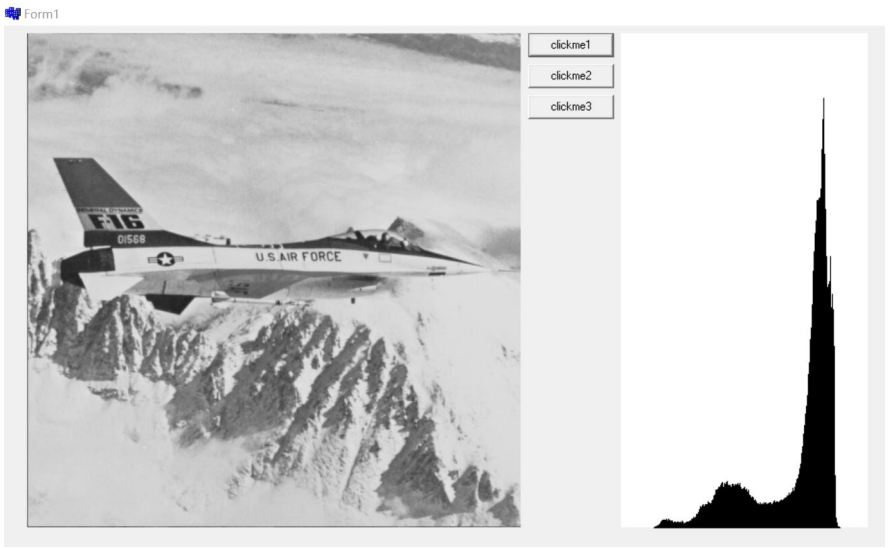
一、執行結果:

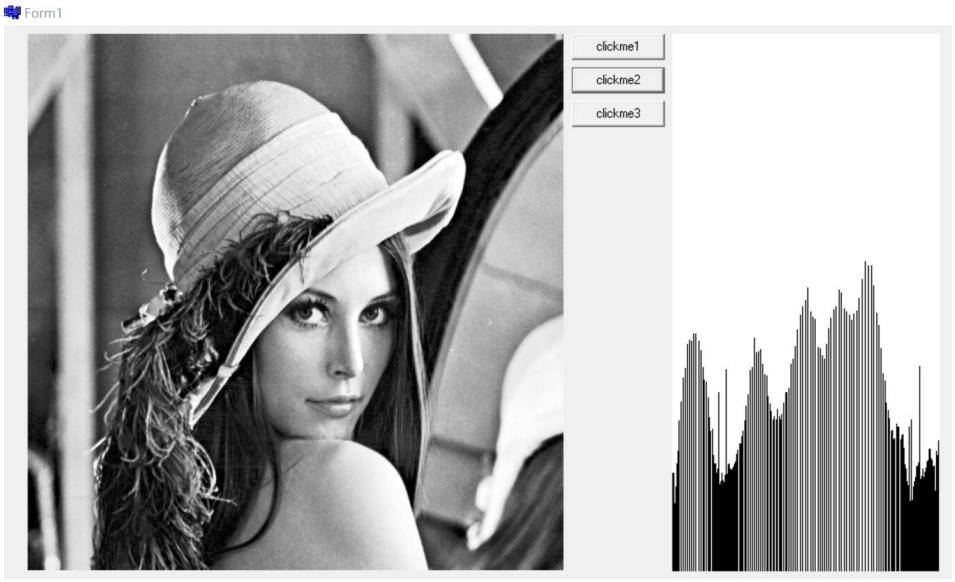
1. Show a raw image and draw the histogram

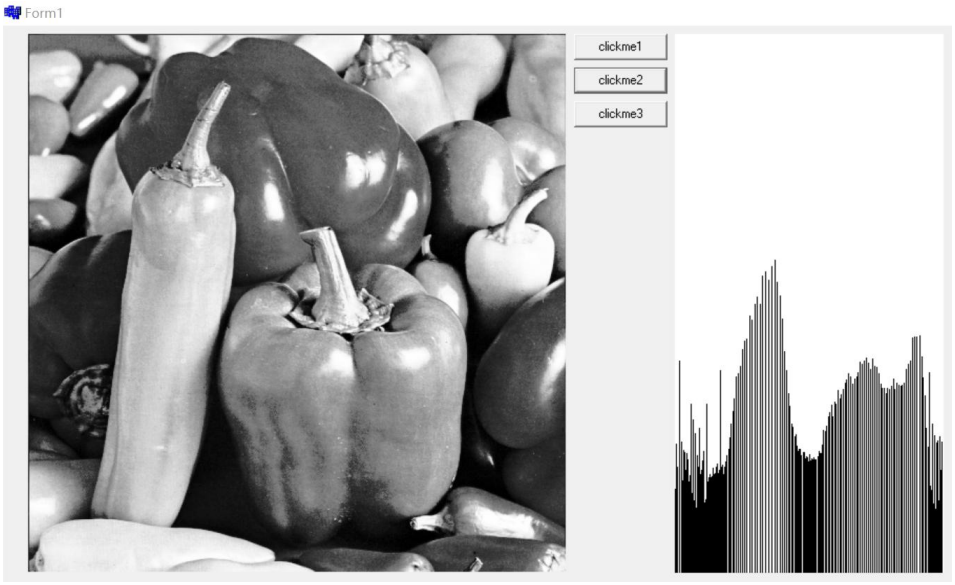


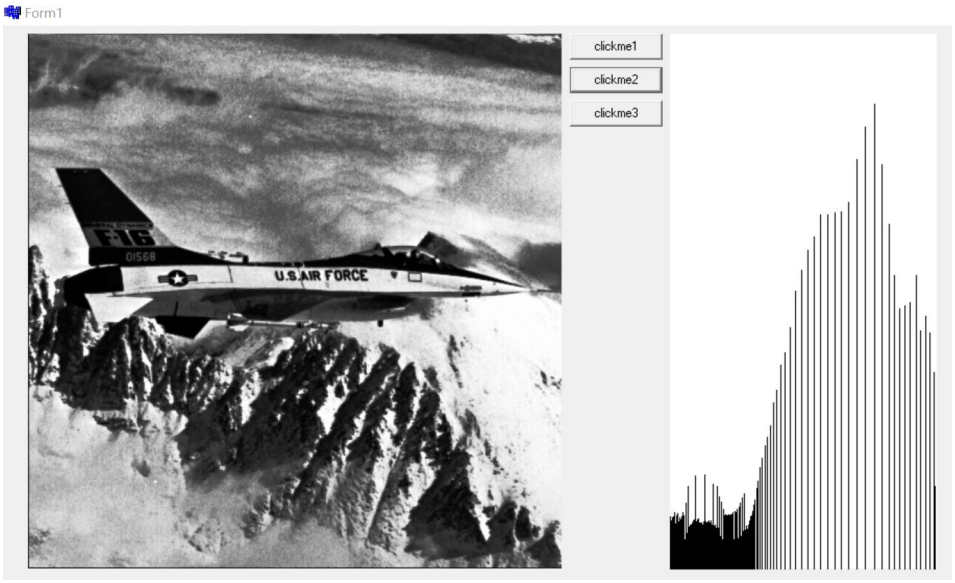




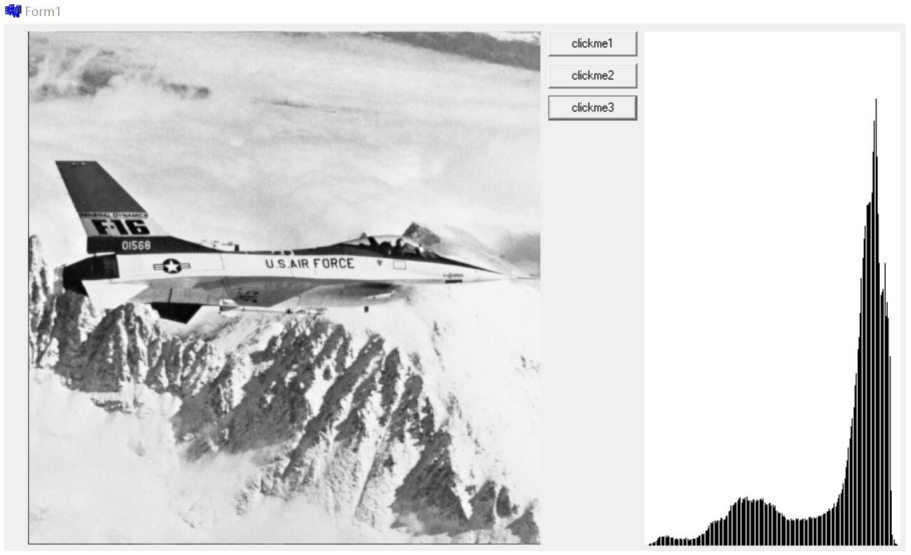
2. Histogram equalization



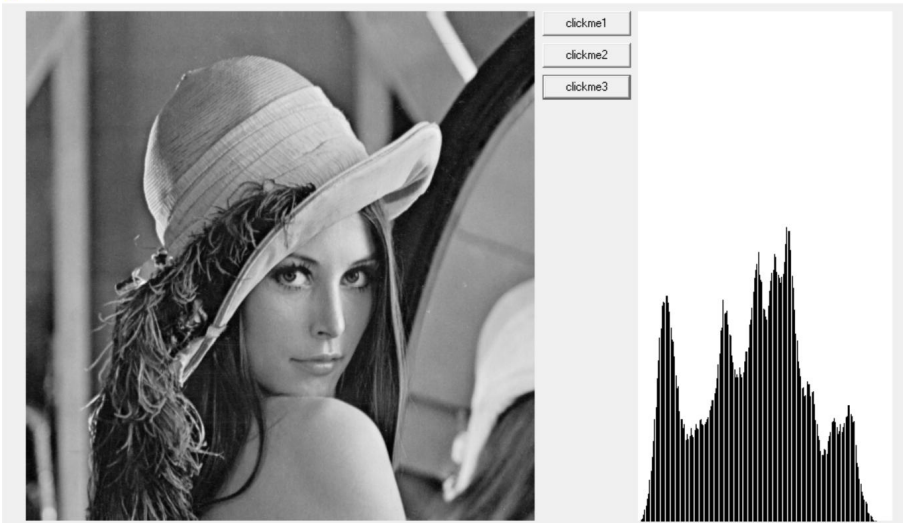




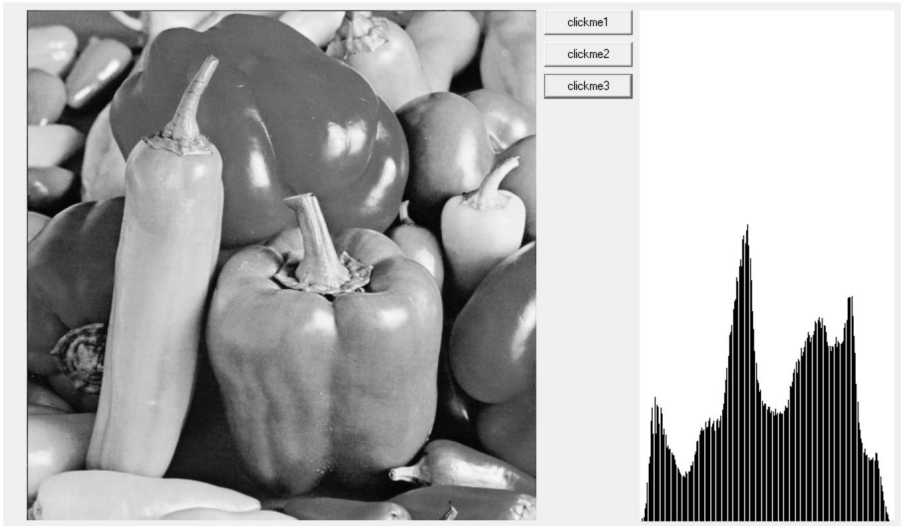
3. Histogram stretch



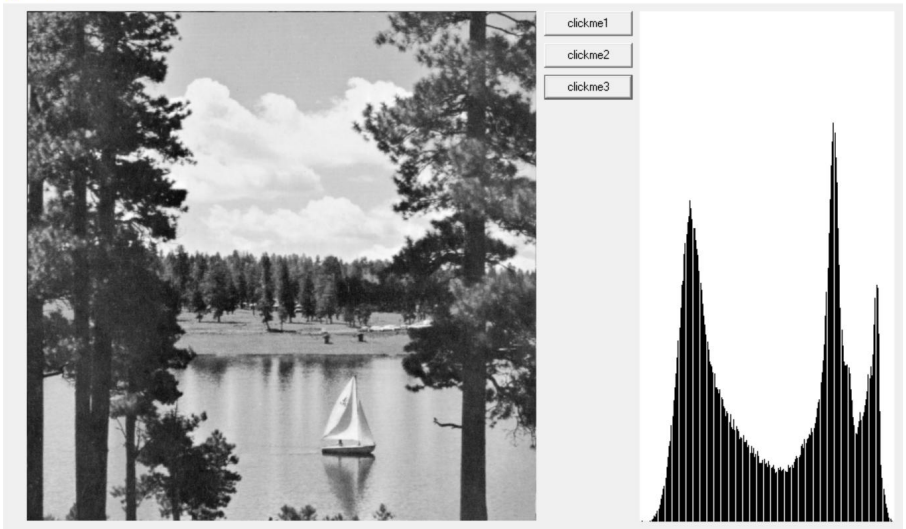
Form1



Form1



Form1



二、程式碼：

```
//---------------------------------------------------------------------
#include <vcl.h>
#include <stdio.h>
#pragma hdrstop

#include "Unit1.h"
//---------------------------------------------------------------------
#pragma package(smart_init)
#pragma resource "*.dfm"
TForm1 *Form1;

unsigned char image_array[512][512];
int a[256]={0};
int height;
int width;
int sizeofimage;

//---------------------------------------------------------------------
__fastcall TForm1::TForm1(TComponent* Owner)
        : TForm(Owner)
{
}
//---------------------------------------------------------------------
void __fastcall TForm1::Button1Click(TObject *Sender)
{
        height = 512;
        width = 512;
        sizeofimage = height*width;

        FILE *file_open;
        String image_name;
        if(OpenDialog1->Execute())
        {
                image_name = ExtractFilePath(OpenDialog1->FileName);
                image_name          =          image_name          +
ExtractFileName(OpenDialog1->FileName);
                file_open = fopen(image_name.c_str(),"rb");
                fread(image_array,sizeof(unsigned
char)*512*512,1,file_open);
                for(int y = 0;y < 512;y++)
                {
```

```
                        for(int x = 0;x < 512;x++)
                        {
                              int pic = image_array[y][x];
                             PaintBox1->Canvas->Pixels[x][y]=RGB(pic,
                      pic,pic);
                              a[pic] = a[pic] + 1;
                        }
                }

                PaintBox2->Canvas->Pen->Color = RGB(255,255,255);
                PaintBox2->Canvas->Brush->Color = RGB(255,255,255);
                PaintBox2->Canvas->Rectangle(0,0,256,512);
                PaintBox2->Canvas->Pen->Color = RGB(0,0,0);

                for(int k = 0;k < 255;k++)
                        {
                            PaintBox2->Canvas->MoveTo(k,512);
                            PaintBox2->Canvas->LineTo(k,512-a[k]/10);
                        }
                fclose(file_open);
        }
}
//---------------------------------------------------------------------
void __fastcall TForm1::Button2Click(TObject *Sender)
{
        height = 512;
        width = 512;
        int e = 0;
        sizeofimage = height*width;

        FILE *file_open;
        String image_name;
        if(OpenDialog1->Execute())
        {
                image_name = ExtractFilePath(OpenDialog1->FileName);
                image_name          =          image_name          +
ExtractFileName(OpenDialog1->FileName);
                file_open = fopen(image_name.c_str(),"rb");
                fread(image_array,sizeof(unsigned
char)*512*512,1,file_open);
                        for(int y = 0;y < 512;y++)
                {
                        for(int x = 0;x < 512;x++)
                        {
```

```
                        int pic = image_array[y][x];
                        a[pic] = a[pic] + 1;//a 数组用来存储每个像素
值的个数
                }
            }
            fclose(file_open);
        }

        int aa[256] = {0};
        int s[256] = {0};
        int t[256] = {0};

        for(int i = 0;i < 256;i++)
        {
            s[i] = s[i-1] + a[i];//s 数组存储 running sum
        }
        for(int j = 0;j < 256;j++)
        {
            t[j] = (int)(255 * s[j] / s[255]);
            aa[t[j]] = aa[t[j]] + a[j];
        }

        PaintBox2->Canvas->Pen->Color = RGB(255,255,255);
        PaintBox2->Canvas->Brush->Color = RGB(255,255,255);
        PaintBox2->Canvas->Rectangle(0,0,256,512);
        PaintBox2->Canvas->Pen->Color = RGB(0,0,0);

        for(int k = 0;k < 255;k++)
        {
            PaintBox2->Canvas->MoveTo(k,512);
            PaintBox2->Canvas->LineTo(k,512-aa[k]/10);
        }
        for(int y = 0;y < 512;y++)
            {
                for(int x = 0;x < 512;x++)
                {
                    int c = image_array[y][x];
                    PaintBox1->Canvas->Pixels[x][y]=RGB(t[c]
                    ,t[c],t[c]);
                }
            }

}
//---------------------------------------------------------------
```

```
void __fastcall TForm1::Button3Click(TObject *Sender)
{
	height = 512;
	width = 512;
	sizeofimage = height*width;
	int pmax = -1;
	int pmin = 100000;

	FILE *file_open;
	String image_name;
	if(OpenDialog1->Execute())
	{
		image_name = ExtractFilePath(OpenDialog1->FileName);
		image_name = image_name +
ExtractFileName(OpenDialog1->FileName);
		file_open = fopen(image_name.c_str(),"rb");
		fread(image_array,sizeof(unsigned
char)*512*512,1,file_open);
		for(int y = 0;y < 512;y++)
		{
			for(int x = 0;x < 512;x++)
			{
				int pic = image_array[y][x];
				a[pic] = a[pic] + 1;
				if(pmax < pic)
				{
					pmax = pic;
				}
				if(pmin > pic)
				{
					pmin = pic;
				}
			}
		}
		fclose(file_open);
	}

	float fpic[256];
	int aa[256] = {0};
	for(int i = pmin;i < pmax + 1;i++)
	{
		fpic[i] = ((float)(i) - (float)pmin)/((float)pmax -
(float)pmin) * 255;
		aa[(int)(fpic[i] + 0.5)] = aa[(int)(fpic[i] + 0.5)] +
```

```
a[i];
	}

	PaintBox2->Canvas->Pen->Color = RGB(255,255,255);
	PaintBox2->Canvas->Brush->Color = RGB(255,255,255);
	PaintBox2->Canvas->Rectangle(0,0,256,512);
	PaintBox2->Canvas->Pen->Color = RGB(0,0,0);

	for(int y = 0;y < 512;y++)
	{
		for(int x = 0;x < 512;x++)
		{
			int c = image_array[y][x];
			PaintBox1->Canvas->Pixels[x][y]=RGB((int)(fpi
			c[c]),(int)(fpic[c]),(int)(fpic[c]));
		}
	}

	for(int k = 0;k < 255;k++)
	{
		PaintBox2->Canvas->MoveTo(k,512);
		PaintBox2->Canvas->LineTo(k,512-aa[k]/10);
	}
}
//---------------------------------------------------------------------
```