**РУСЕНСКИ УНИВЕРСИТЕТ „АНГЕЛ КЪНЧЕВ“**

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# Задание

Да се напише програма, която позволява отварянето на две изображения в нива на сивото, записани във формат PGM – текст (идентификатор P2) и позволява намирането на средно аритметично на изображенията.

Резултатът да се показва до оригиналното изображение или в отделен прозорец и да може да бъде съхранен като изображение в същия формат.

# Код на програмата (листинг)



* Prоgram.cs

namespace AverageOfTwoP2Images

{

using System;

using System.Windows.Forms;

static class Program

{

[STAThread]

static void Main()

{

Application.EnableVisualStyles();

Application.SetCompatibleTextRenderingDefault(false);

Application.Run(new FormMain());

}

}

}

* PgmImage.cs

namespace AverageOfTwoP2Images

{

using System;

using System.IO;

public class PgmImage

{

private int width;

private int height;

private int maxVal;

private byte[] data;

private string magicNumber;

private string comment;

public int Width

{

get

{

return width;

}

set

{

width = value;

}

}

public int Height

{

get

{

return height;

}

set

{

height = value;

}

}

public int MaxVal

{

get

{

return maxVal;

}

set

{

maxVal = value;

}

}

public byte[] Data

{

get

{

return data;

}

set

{

data = value;

}

}

public string MagicNumber

{

get

{

return magicNumber;

}

set

{

magicNumber = value;

}

}

public string Comment

{

get

{

return comment;

}

set

{

comment = value;

}

}

public string Header

{

get

{

return this.MagicNumber + Convert.ToChar(10) +

'#' + this.comment + Convert.ToChar(10) +

this.width.ToString() + " " + this.height.ToString() + Convert.ToChar(10) +

this.maxVal.ToString() + Convert.ToChar(10);

}

}

public PgmImage(int width, int height, string magicNumber, string comment, int maxVal)

{

this.width = width;

this.height = height;

this.data = new byte[width \* height];

this.magicNumber = magicNumber;

this.comment = comment;

this.maxVal = maxVal;

}

public PgmImage(string filePath)

{

ReadPGM(filePath);

}

public void Save(string filePath)

{

WritePGM(filePath);

}

private void ReadPGM(string filePath)

{

/\*

P2

# feep.ascii.pgm

24 7

15

[data]

OR

P2

24 7

15

[data]

\*/

string line;

FileStream InputStream = File.OpenRead(filePath);

using (StreamReader PGMReader = new StreamReader(InputStream))

{

this.magicNumber = PGMReader.ReadLine().Trim();

if (this.magicNumber != "P2")

{

throw new InvalidDataException("Invalid magic number " + magicNumber);

}

this.comment = PGMReader.ReadLine().Trim();

if (!this.comment.StartsWith("#"))

{

line = this.comment;

this.comment = null;

}

else

{

line = PGMReader.ReadLine().Trim();

}

int[] size = Array.ConvertAll(line.Split(new char[] { ' ' }, StringSplitOptions.RemoveEmptyEntries), int.Parse);

this.width = size[0];

this.height = size[1];

this.data = new byte[this.width \* this.height];

this.maxVal = int.Parse(PGMReader.ReadLine().Trim());

// read data

int currentLastIndex = 0;

while ((line = PGMReader.ReadLine()) != null)

{

byte[] row = Array.ConvertAll(line.Split(new char[] { ' ' }, StringSplitOptions.RemoveEmptyEntries), byte.Parse);

Array.Copy(row, 0, this.data, currentLastIndex, row.Length);

currentLastIndex += row.Length;

}

}

InputStream.Close();

}

private void WritePGM(string filePath)

{

FileStream OutputStream = File.Create(filePath);

BinaryWriter PGMWriter = new BinaryWriter(OutputStream);

string PGMInfo = this.Header;

byte[] PGMInfoBuffer = System.Text.ASCIIEncoding.Default.GetBytes(PGMInfo);

PGMWriter.Write(PGMInfoBuffer);

if (this.magicNumber != "P2")

{

throw new InvalidDataException("Invalid magic number " + magicNumber);

}

byte NewLineAsciiCode = 10;

byte SpaceAsciiCode = 32;

int Temp;

for (int i = 0; i < this.height \* this.width; i++)

{

//File is text based, convert every byte to text representation followed by "space"

Temp = this.data[i];

byte[] TempByteArray = System.Text.ASCIIEncoding.Default.GetBytes(Temp.ToString());

PGMWriter.Write(TempByteArray);

PGMWriter.Write(SpaceAsciiCode);

if (i % this.Width == 0)

{

PGMWriter.Write(NewLineAsciiCode);

}

}

PGMWriter.Close();

}

}

}

* FormMain.cs

namespace AverageOfTwoP2Images

{

using System;

using System.Collections.Generic;

using System.ComponentModel;

using System.Data;

using System.Drawing;

using System.Linq;

using System.Text;

using System.Threading.Tasks;

using System.Windows.Forms;

public partial class FormMain : Form

{

private string inputFileNameOne, inputFileNameTwo;

private string outputFileName;

private PgmImage pgmOriginalImageOne, pgmOriginalImageTwo;

private PgmImage pgmResultImage;

public FormMain()

{

InitializeComponent();

}

public Bitmap PgmToBitmap(PgmImage pgmImage)

{

if (pgmImage != null && pgmImage.MagicNumber == "P2")

{

int width = pgmImage.Width;

int height = pgmImage.Height;

Bitmap result = new Bitmap(width, height);

Graphics gr = Graphics.FromImage(result);

int pixel = 0;

for (int i = 0; i < pgmImage.Height; ++i)

{

for (int j = 0; j < pgmImage.Width; ++j)

{

int pixelColor = pgmImage.Data[pixel++];

Color c = Color.FromArgb(pixelColor, pixelColor, pixelColor);

SolidBrush sb = new SolidBrush(c);

gr.FillRectangle(sb, j, i, 1, 1);

}

}

return result;

}

return null;

}

private void btnShowResult\_Click(object sender, EventArgs e)

{

Cursor.Current = Cursors.WaitCursor;

pgmResultImage = null;

int width = pgmOriginalImageOne.Width;

int height = pgmOriginalImageOne.Height;

if (width > pgmOriginalImageTwo.Width)

{

width = pgmOriginalImageTwo.Width;

}

if (height > pgmOriginalImageTwo.Height)

{

height = pgmOriginalImageTwo.Height;

}

pgmResultImage = new PgmImage(width, height, "P2", "", Int32.MinValue);

int rCounter = 0;

int fCounter = 0;

int sCounter = 0;

for (int i = 0; i < pgmResultImage.Height; i++)

{

for (int j = 0; j < pgmResultImage.Width; j++)

{

pgmResultImage.Data[rCounter] = (byte)((pgmOriginalImageOne.Data[fCounter] + pgmOriginalImageTwo.Data[sCounter]) / 2);

if (pgmResultImage.MaxVal < pgmResultImage.Data[rCounter])

{

pgmResultImage.MaxVal = pgmResultImage.Data[rCounter];

}

rCounter++;

fCounter++;

sCounter++;

}

fCounter += (pgmOriginalImageOne.Width - pgmResultImage.Width);

sCounter += (pgmOriginalImageTwo.Width - pgmResultImage.Width);

}

pbResultImage.Image = PgmToBitmap(pgmResultImage);

btnSave.Enabled = true;

Cursor.Current = Cursors.Default;

}

private void btnSave\_Click(object sender, EventArgs e)

{

DialogResult dlgResult = saveFileDialog1.ShowDialog();

if (dlgResult == DialogResult.OK)

{

outputFileName = saveFileDialog1.FileName;

try

{

pgmResultImage.Save(outputFileName);

}

catch (Exception ex)

{

MessageBox.Show(ex.Message);

}

}

}

private void btnLoadFirstImage\_Click(object sender, EventArgs e)

{

DialogResult dlgResult = openFileDialog1.ShowDialog();

if (dlgResult == DialogResult.OK)

{

try

{

pgmOriginalImageOne = new PgmImage(openFileDialog1.FileName);

}

catch (Exception ex)

{

MessageBox.Show(ex.Message);

}

pbFirstImage.Image = PgmToBitmap(pgmOriginalImageOne);

if (pbFirstImage.Image != null)

{

inputFileNameOne = openFileDialog1.FileName;

pbFirstImage.Visible = true;

outputFileName = null;

if (inputFileNameTwo != null)

{

btnShowResult.Enabled = true;

}

else

{

btnShowResult.Enabled = false;

}

}

else

{

inputFileNameOne = null;

pbFirstImage.Visible = false;

}

}

}

private void btnLoadSecondImage\_Click(object sender, EventArgs e)

{

DialogResult dlgResult = openFileDialog1.ShowDialog();

if (dlgResult == DialogResult.OK)

{

try

{

pgmOriginalImageTwo = new PgmImage(openFileDialog1.FileName);

}

catch (Exception ex)

{

MessageBox.Show(ex.Message);

}

pbSecondImage.Image = PgmToBitmap(pgmOriginalImageTwo);

if (pbSecondImage.Image != null)

{

inputFileNameTwo = openFileDialog1.FileName;

if (inputFileNameOne != null)

{

btnShowResult.Enabled = true;

}

else

{

btnShowResult.Enabled = false;

}

}

else

{

inputFileNameTwo = null;

}

}

}

}

}

* FormMain.Designer.cs

namespace AverageOfTwoP2Images

{

partial class FormMain

{

/// <summary>

/// Required designer variable.

/// </summary>

private System.ComponentModel.IContainer components = null;

/// <summary>

/// Clean up any resources being used.

/// </summary>

/// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>

protected override void Dispose(bool disposing)

{

if (disposing && (components != null))

{

components.Dispose();

}

base.Dispose(disposing);

}

#region Windows Form Designer generated code

/// <summary>

/// Required method for Designer support - do not modify

/// the contents of this method with the code editor.

/// </summary>

private void InitializeComponent()

{

this.tableLayoutPanel1 = new System.Windows.Forms.TableLayoutPanel();

this.tableLayoutPanel2 = new System.Windows.Forms.TableLayoutPanel();

this.tableLayoutPanel3 = new System.Windows.Forms.TableLayoutPanel();

this.pnlFirstImage = new System.Windows.Forms.Panel();

this.pbFirstImage = new System.Windows.Forms.PictureBox();

this.pnlSecondImage = new System.Windows.Forms.Panel();

this.pbSecondImage = new System.Windows.Forms.PictureBox();

this.pnlResult = new System.Windows.Forms.Panel();

this.pbResultImage = new System.Windows.Forms.PictureBox();

this.pnlButtons = new System.Windows.Forms.Panel();

this.btnSave = new System.Windows.Forms.Button();

this.btnShowResult = new System.Windows.Forms.Button();

this.btnLoadSecondImage = new System.Windows.Forms.Button();

this.btnLoadFirstImage = new System.Windows.Forms.Button();

this.openFileDialog1 = new System.Windows.Forms.OpenFileDialog();

this.saveFileDialog1 = new System.Windows.Forms.SaveFileDialog();

this.tableLayoutPanel1.SuspendLayout();

this.tableLayoutPanel2.SuspendLayout();

this.tableLayoutPanel3.SuspendLayout();

this.pnlFirstImage.SuspendLayout();

((System.ComponentModel.ISupportInitialize)(this.pbFirstImage)).BeginInit();

this.pnlSecondImage.SuspendLayout();

((System.ComponentModel.ISupportInitialize)(this.pbSecondImage)).BeginInit();

this.pnlResult.SuspendLayout();

((System.ComponentModel.ISupportInitialize)(this.pbResultImage)).BeginInit();

this.pnlButtons.SuspendLayout();

this.SuspendLayout();

//

// tableLayoutPanel1

//

this.tableLayoutPanel1.ColumnCount = 2;

this.tableLayoutPanel1.ColumnStyles.Add(new System.Windows.Forms.ColumnStyle(System.Windows.Forms.SizeType.Absolute, 150F));

this.tableLayoutPanel1.ColumnStyles.Add(new System.Windows.Forms.ColumnStyle(System.Windows.Forms.SizeType.Percent, 100F));

this.tableLayoutPanel1.Controls.Add(this.tableLayoutPanel2, 1, 0);

this.tableLayoutPanel1.Controls.Add(this.pnlButtons, 0, 0);

this.tableLayoutPanel1.Dock = System.Windows.Forms.DockStyle.Fill;

this.tableLayoutPanel1.Location = new System.Drawing.Point(0, 0);

this.tableLayoutPanel1.Name = "tableLayoutPanel1";

this.tableLayoutPanel1.RowCount = 1;

this.tableLayoutPanel1.RowStyles.Add(new System.Windows.Forms.RowStyle(System.Windows.Forms.SizeType.Percent, 100F));

this.tableLayoutPanel1.Size = new System.Drawing.Size(929, 568);

this.tableLayoutPanel1.TabIndex = 0;

//

// tableLayoutPanel2

//

this.tableLayoutPanel2.ColumnCount = 1;

this.tableLayoutPanel2.ColumnStyles.Add(new System.Windows.Forms.ColumnStyle(System.Windows.Forms.SizeType.Percent, 100F));

this.tableLayoutPanel2.Controls.Add(this.tableLayoutPanel3, 0, 0);

this.tableLayoutPanel2.Controls.Add(this.pnlResult, 0, 1);

this.tableLayoutPanel2.Dock = System.Windows.Forms.DockStyle.Fill;

this.tableLayoutPanel2.Location = new System.Drawing.Point(150, 0);

this.tableLayoutPanel2.Margin = new System.Windows.Forms.Padding(0);

this.tableLayoutPanel2.Name = "tableLayoutPanel2";

this.tableLayoutPanel2.RowCount = 2;

this.tableLayoutPanel2.RowStyles.Add(new System.Windows.Forms.RowStyle(System.Windows.Forms.SizeType.Percent, 35F));

this.tableLayoutPanel2.RowStyles.Add(new System.Windows.Forms.RowStyle(System.Windows.Forms.SizeType.Percent, 65F));

this.tableLayoutPanel2.Size = new System.Drawing.Size(779, 568);

this.tableLayoutPanel2.TabIndex = 0;

//

// tableLayoutPanel3

//

this.tableLayoutPanel3.ColumnCount = 2;

this.tableLayoutPanel3.ColumnStyles.Add(new System.Windows.Forms.ColumnStyle(System.Windows.Forms.SizeType.Percent, 50F));

this.tableLayoutPanel3.ColumnStyles.Add(new System.Windows.Forms.ColumnStyle(System.Windows.Forms.SizeType.Percent, 50F));

this.tableLayoutPanel3.Controls.Add(this.pnlFirstImage, 0, 0);

this.tableLayoutPanel3.Controls.Add(this.pnlSecondImage, 1, 0);

this.tableLayoutPanel3.Dock = System.Windows.Forms.DockStyle.Fill;

this.tableLayoutPanel3.Location = new System.Drawing.Point(0, 0);

this.tableLayoutPanel3.Margin = new System.Windows.Forms.Padding(0);

this.tableLayoutPanel3.Name = "tableLayoutPanel3";

this.tableLayoutPanel3.RowCount = 1;

this.tableLayoutPanel3.RowStyles.Add(new System.Windows.Forms.RowStyle(System.Windows.Forms.SizeType.Percent, 100F));

this.tableLayoutPanel3.RowStyles.Add(new System.Windows.Forms.RowStyle(System.Windows.Forms.SizeType.Absolute, 198F));

this.tableLayoutPanel3.Size = new System.Drawing.Size(779, 198);

this.tableLayoutPanel3.TabIndex = 0;

//

// pnlFirstImage

//

this.pnlFirstImage.AutoScroll = true;

this.pnlFirstImage.Controls.Add(this.pbFirstImage);

this.pnlFirstImage.Dock = System.Windows.Forms.DockStyle.Fill;

this.pnlFirstImage.Location = new System.Drawing.Point(3, 3);

this.pnlFirstImage.Name = "pnlFirstImage";

this.pnlFirstImage.Size = new System.Drawing.Size(383, 192);

this.pnlFirstImage.TabIndex = 2;

//

// pbFirstImage

//

this.pbFirstImage.BackColor = System.Drawing.Color.Transparent;

this.pbFirstImage.Location = new System.Drawing.Point(0, 0);

this.pbFirstImage.Margin = new System.Windows.Forms.Padding(0);

this.pbFirstImage.Name = "pbFirstImage";

this.pbFirstImage.Size = new System.Drawing.Size(50, 50);

this.pbFirstImage.SizeMode = System.Windows.Forms.PictureBoxSizeMode.AutoSize;

this.pbFirstImage.TabIndex = 1;

this.pbFirstImage.TabStop = false;

//

// pnlSecondImage

//

this.pnlSecondImage.AutoScroll = true;

this.pnlSecondImage.Controls.Add(this.pbSecondImage);

this.pnlSecondImage.Dock = System.Windows.Forms.DockStyle.Fill;

this.pnlSecondImage.Location = new System.Drawing.Point(392, 3);

this.pnlSecondImage.Name = "pnlSecondImage";

this.pnlSecondImage.Size = new System.Drawing.Size(384, 192);

this.pnlSecondImage.TabIndex = 3;

//

// pbSecondImage

//

this.pbSecondImage.BackColor = System.Drawing.Color.Transparent;

this.pbSecondImage.Location = new System.Drawing.Point(0, 0);

this.pbSecondImage.Margin = new System.Windows.Forms.Padding(0);

this.pbSecondImage.Name = "pbSecondImage";

this.pbSecondImage.Size = new System.Drawing.Size(50, 50);

this.pbSecondImage.SizeMode = System.Windows.Forms.PictureBoxSizeMode.AutoSize;

this.pbSecondImage.TabIndex = 2;

this.pbSecondImage.TabStop = false;

//

// pnlResult

//

this.pnlResult.AutoScroll = true;

this.pnlResult.Controls.Add(this.pbResultImage);

this.pnlResult.Dock = System.Windows.Forms.DockStyle.Fill;

this.pnlResult.Location = new System.Drawing.Point(3, 201);

this.pnlResult.Name = "pnlResult";

this.pnlResult.Size = new System.Drawing.Size(773, 364);

this.pnlResult.TabIndex = 1;

//

// pbResultImage

//

this.pbResultImage.BackColor = System.Drawing.Color.Transparent;

this.pbResultImage.Location = new System.Drawing.Point(0, 0);

this.pbResultImage.Margin = new System.Windows.Forms.Padding(0);

this.pbResultImage.Name = "pbResultImage";

this.pbResultImage.Size = new System.Drawing.Size(50, 50);

this.pbResultImage.SizeMode = System.Windows.Forms.PictureBoxSizeMode.AutoSize;

this.pbResultImage.TabIndex = 2;

this.pbResultImage.TabStop = false;

//

// pnlButtons

//

this.pnlButtons.Controls.Add(this.btnSave);

this.pnlButtons.Controls.Add(this.btnShowResult);

this.pnlButtons.Controls.Add(this.btnLoadSecondImage);

this.pnlButtons.Controls.Add(this.btnLoadFirstImage);

this.pnlButtons.Dock = System.Windows.Forms.DockStyle.Fill;

this.pnlButtons.Location = new System.Drawing.Point(0, 0);

this.pnlButtons.Margin = new System.Windows.Forms.Padding(0);

this.pnlButtons.Name = "pnlButtons";

this.pnlButtons.Size = new System.Drawing.Size(150, 568);

this.pnlButtons.TabIndex = 1;

//

// btnSave

//

this.btnSave.Enabled = false;

this.btnSave.Location = new System.Drawing.Point(12, 131);

this.btnSave.Name = "btnSave";

this.btnSave.Size = new System.Drawing.Size(125, 23);

this.btnSave.TabIndex = 3;

this.btnSave.Text = "Запази резултата";

this.btnSave.UseVisualStyleBackColor = true;

this.btnSave.Click += new System.EventHandler(this.btnSave\_Click);

//

// btnShowResult

//

this.btnShowResult.Enabled = false;

this.btnShowResult.Location = new System.Drawing.Point(12, 100);

this.btnShowResult.Name = "btnShowResult";

this.btnShowResult.Size = new System.Drawing.Size(125, 25);

this.btnShowResult.TabIndex = 2;

this.btnShowResult.Text = "Покажи резултата";

this.btnShowResult.UseVisualStyleBackColor = true;

this.btnShowResult.Click += new System.EventHandler(this.btnShowResult\_Click);

//

// btnLoadSecondImage

//

this.btnLoadSecondImage.Location = new System.Drawing.Point(12, 41);

this.btnLoadSecondImage.Name = "btnLoadSecondImage";

this.btnLoadSecondImage.Size = new System.Drawing.Size(125, 25);

this.btnLoadSecondImage.TabIndex = 1;

this.btnLoadSecondImage.Text = "Изображение 2";

this.btnLoadSecondImage.UseVisualStyleBackColor = true;

this.btnLoadSecondImage.Click += new System.EventHandler(this.btnLoadSecondImage\_Click);

//

// btnLoadFirstImage

//

this.btnLoadFirstImage.Location = new System.Drawing.Point(12, 12);

this.btnLoadFirstImage.Name = "btnLoadFirstImage";

this.btnLoadFirstImage.Size = new System.Drawing.Size(125, 23);

this.btnLoadFirstImage.TabIndex = 0;

this.btnLoadFirstImage.Text = "Изображение 1";

this.btnLoadFirstImage.UseVisualStyleBackColor = true;

this.btnLoadFirstImage.Click += new System.EventHandler(this.btnLoadFirstImage\_Click);

//

// openFileDialog1

//

this.openFileDialog1.Filter = "Portable Gray Map | \*.pgm";

//

// saveFileDialog1

//

this.saveFileDialog1.Filter = "Portable Gray Map | \*.pgm";

//

// FormMain

//

this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);

this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;

this.ClientSize = new System.Drawing.Size(929, 568);

this.Controls.Add(this.tableLayoutPanel1);

this.Name = "FormMain";

this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;

this.Text = "Средноаритметично на две Р2 изображения";

this.tableLayoutPanel1.ResumeLayout(false);

this.tableLayoutPanel2.ResumeLayout(false);

this.tableLayoutPanel3.ResumeLayout(false);

this.pnlFirstImage.ResumeLayout(false);

this.pnlFirstImage.PerformLayout();

((System.ComponentModel.ISupportInitialize)(this.pbFirstImage)).EndInit();

this.pnlSecondImage.ResumeLayout(false);

this.pnlSecondImage.PerformLayout();

((System.ComponentModel.ISupportInitialize)(this.pbSecondImage)).EndInit();

this.pnlResult.ResumeLayout(false);

this.pnlResult.PerformLayout();

((System.ComponentModel.ISupportInitialize)(this.pbResultImage)).EndInit();

this.pnlButtons.ResumeLayout(false);

this.ResumeLayout(false);

}

#endregion

private System.Windows.Forms.TableLayoutPanel tableLayoutPanel1;

private System.Windows.Forms.TableLayoutPanel tableLayoutPanel2;

private System.Windows.Forms.TableLayoutPanel tableLayoutPanel3;

private System.Windows.Forms.Panel pnlButtons;

private System.Windows.Forms.Button btnShowResult;

private System.Windows.Forms.Button btnLoadSecondImage;

private System.Windows.Forms.Button btnLoadFirstImage;

private System.Windows.Forms.Button btnSave;

private System.Windows.Forms.OpenFileDialog openFileDialog1;

private System.Windows.Forms.Panel pnlFirstImage;

private System.Windows.Forms.PictureBox pbFirstImage;

private System.Windows.Forms.Panel pnlSecondImage;

private System.Windows.Forms.PictureBox pbSecondImage;

private System.Windows.Forms.Panel pnlResult;

private System.Windows.Forms.PictureBox pbResultImage;

private System.Windows.Forms.SaveFileDialog saveFileDialog1;

}

}

# Демо

