KUIS 1

PENGOLAHAN CITRA

MK401

POLITEKNIK NEGERI Batam

Disusun oleh :

Ricky Silitonga (4211901034)

PROGRAM STUDI TEKNIK MEKATRONIKA

JURUSAN TEKNIK ELEKTRO

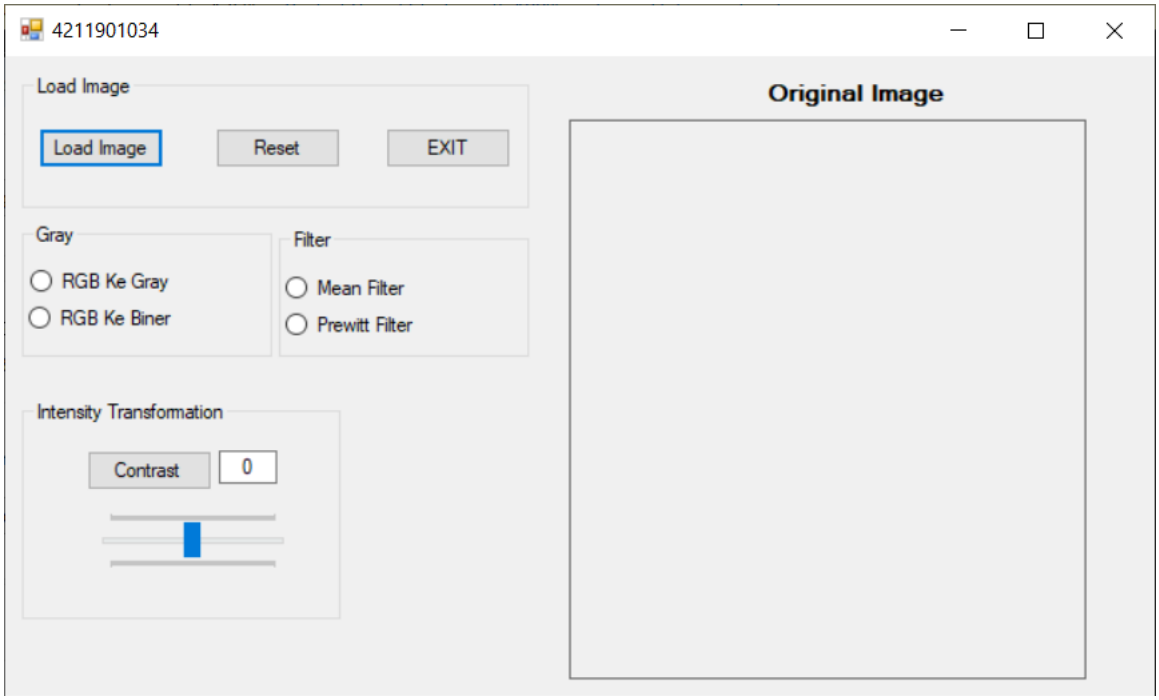
POLITEKNIK NEGERI BATAM

2020

Buatlah suatu aplikasi pengolahan citra yang dapat melakukan operasi pengolahan citra sbb :

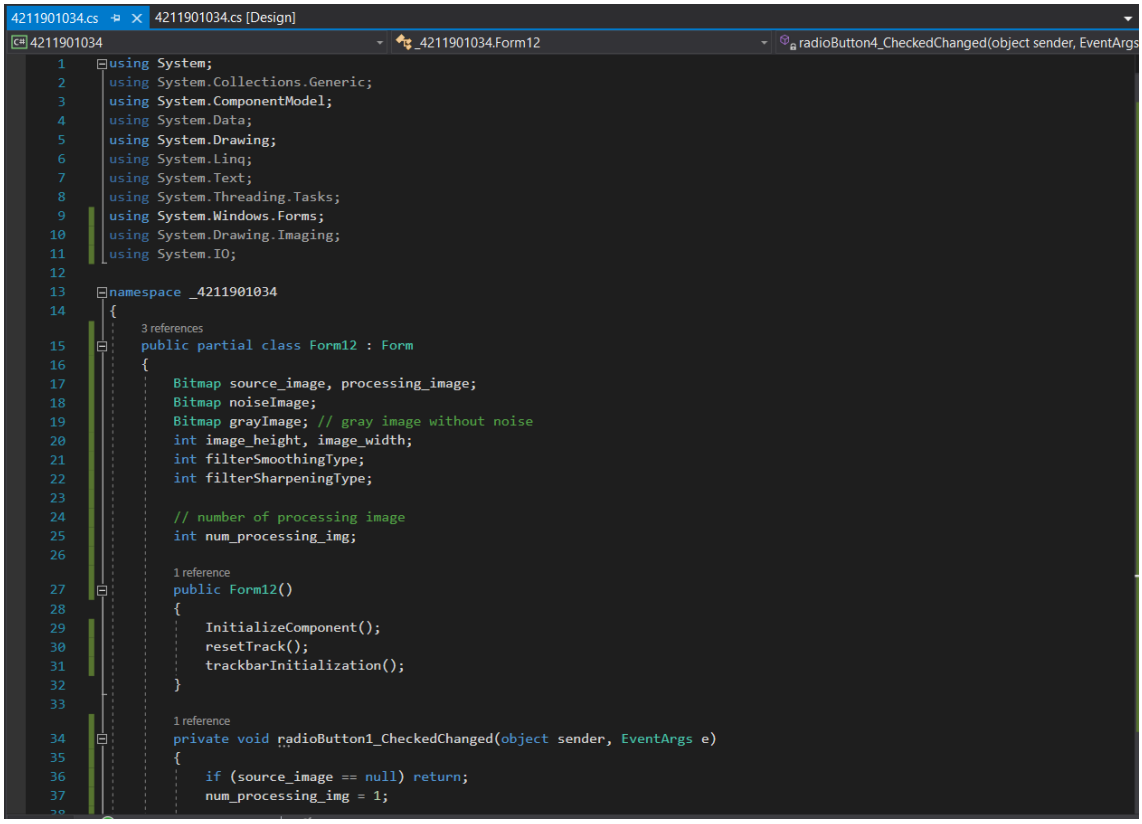
1. Konversi RGB ke Gray
2. Konversi RGB ke Biner
3. RGB intensity transformation (Contrast)
4. Image Smoothing using Mean Filter
5. Image Sharpening (edge detection) using Prewitt

Screen shoot GUI

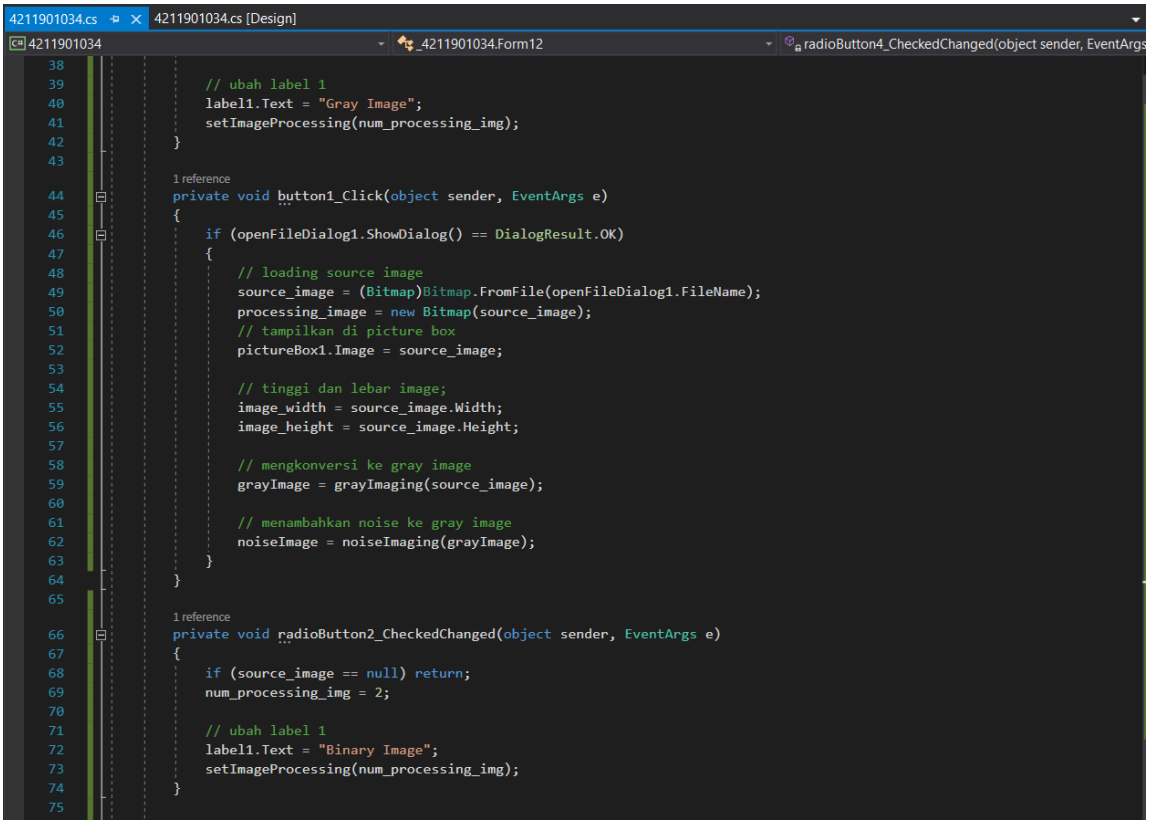


Tampilan awal program

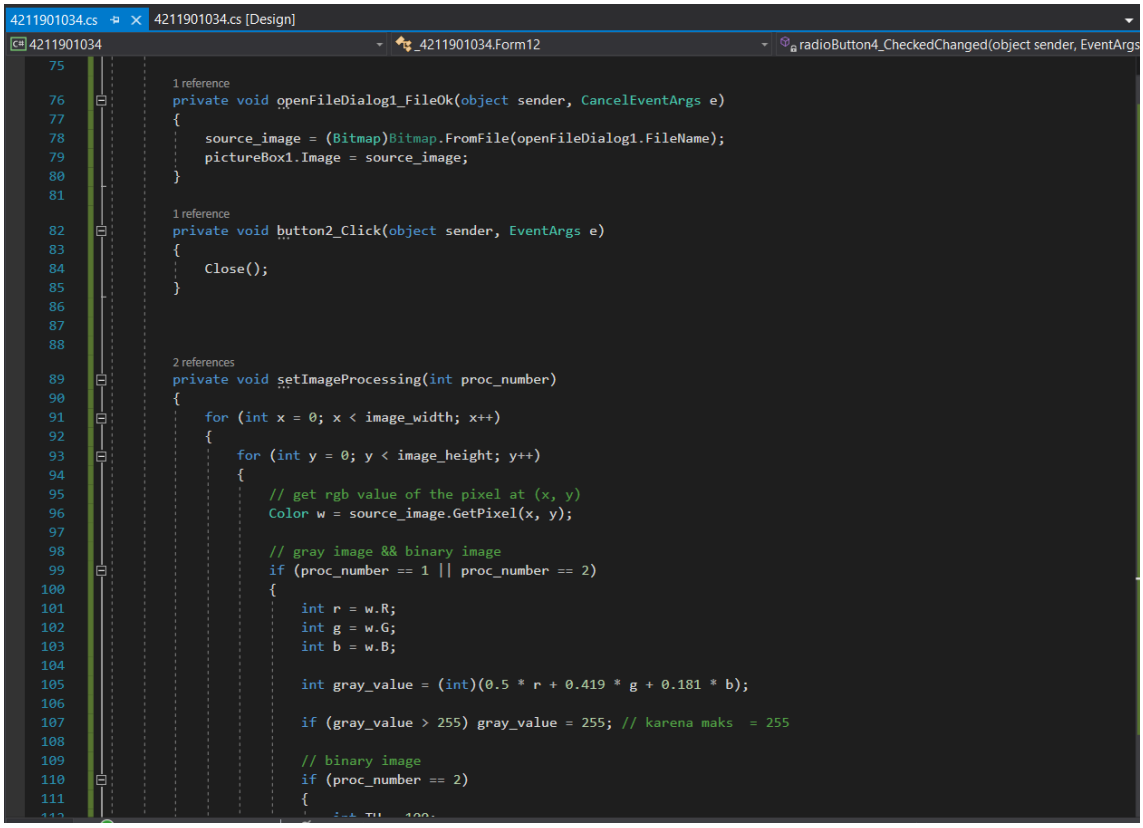
Screenshoot SourceCode



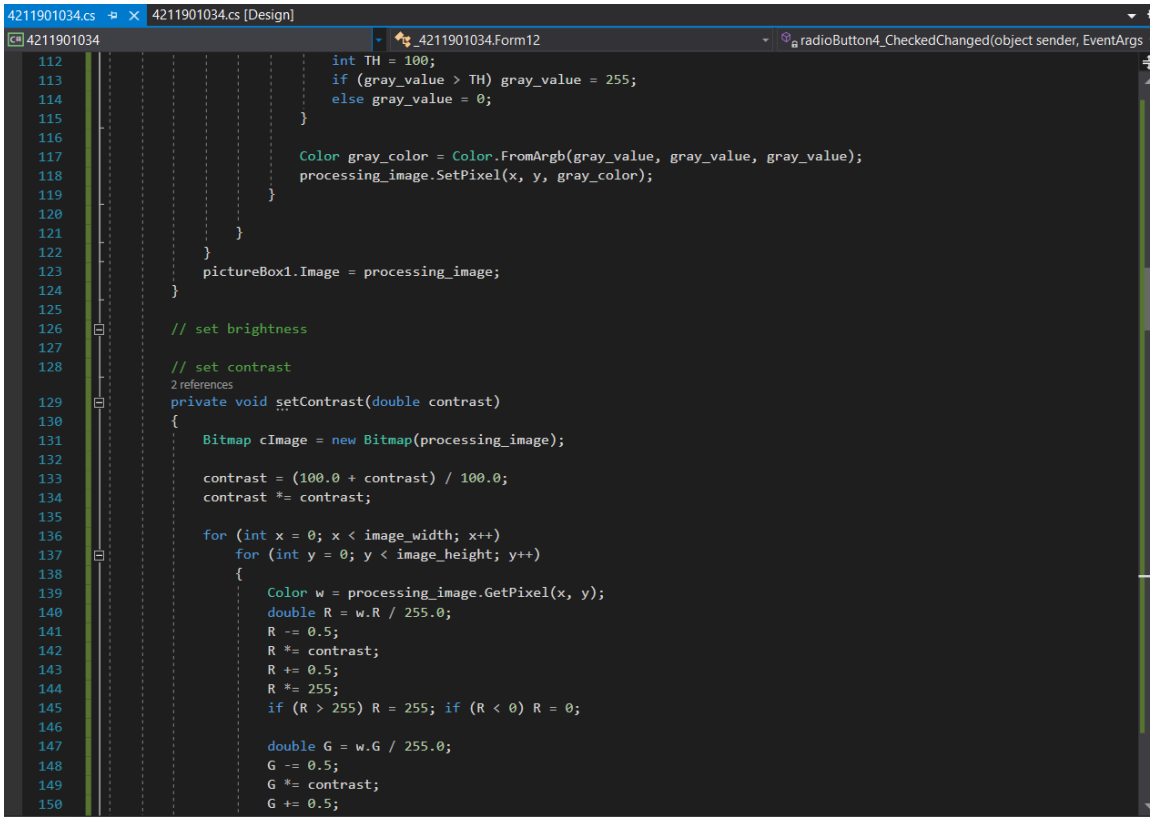
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs

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;
using System.Drawing.Imaging;
using System.IO;

namespace _4211901034
{
    3 references
    public partial class Form12 : Form
    {
        Bitmap source_image, processing_image;
        Bitmap noiseImage;
        Bitmap grayImage; // gray image without noise
        int image_height, image_width;
        int filterSmoothingType;
        int filterSharpeningType;

        // number of processing image
        int num_processing_img;

        1 reference
        public Form12()
        {
            InitializeComponent();
            resetTrack();
            trackbarInitialization();
        }

        1 reference
        private void radioButton1_CheckedChanged(object sender, EventArgs e)
        {
            if (source_image == null) return;
            num_processing_img = 1;
```



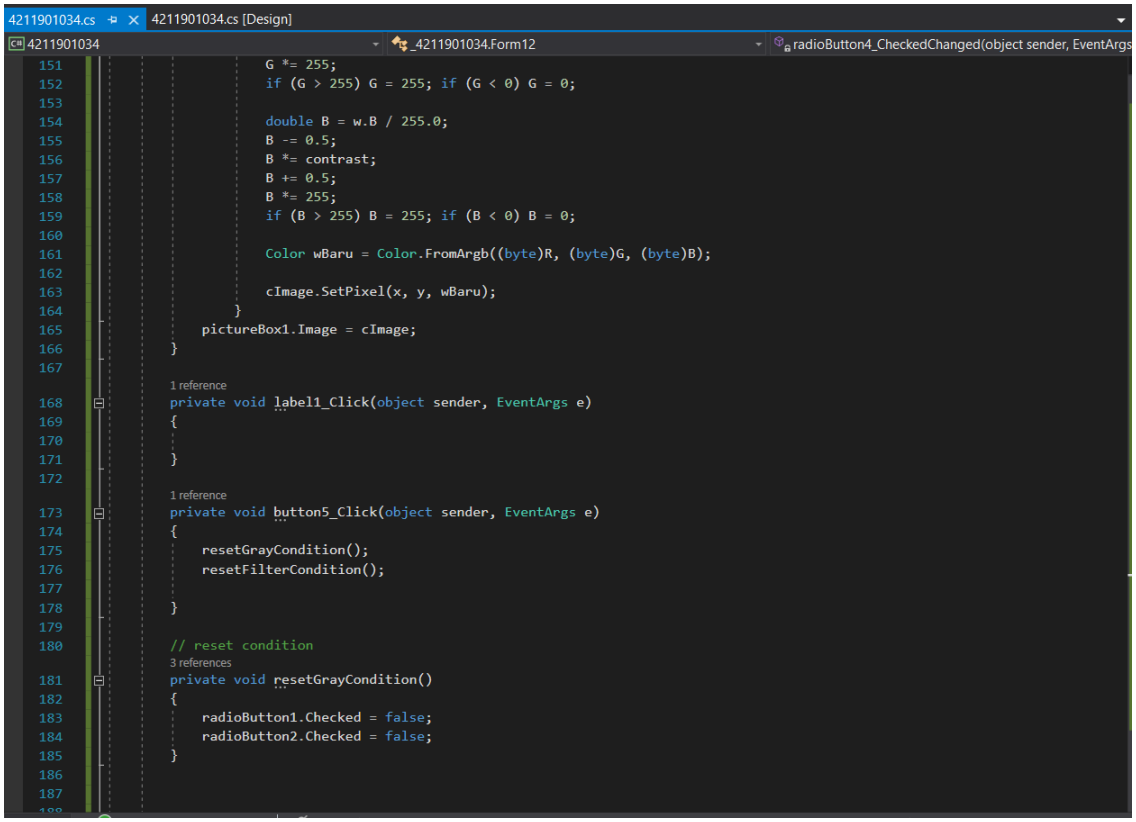
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs

            // ubah label 1
            label1.Text = "Gray Image";
            setImageProcessing(num_processing_img);
        }

        1 reference
        private void button1_Click(object sender, EventArgs e)
        {
            if (openFileDialog1.ShowDialog() == DialogResult.OK)
            {
                // loading source image
                source_image = (Bitmap)Bitmap.FromFile(openFileDialog1.FileName);
                processing_image = new Bitmap(source_image);
                // tampilkan di picture box
                pictureBox1.Image = source_image;

                // tinggi dan lebar image;
                image_width = source_image.Width;
                image_height = source_image.Height;

                // mengkonversi ke gray image
                grayImage = grayImaging(source_image);

                // menambahkan noise ke gray image
                noiseImage = noiseImaging(grayImage);
            }
        }

        1 reference
        private void radioButton2_CheckedChanged(object sender, EventArgs e)
        {
            if (source_image == null) return;
            num_processing_img = 2;

            // ubah label 1
            label1.Text = "Binary Image";
            setImageProcessing(num_processing_img);
        }
```



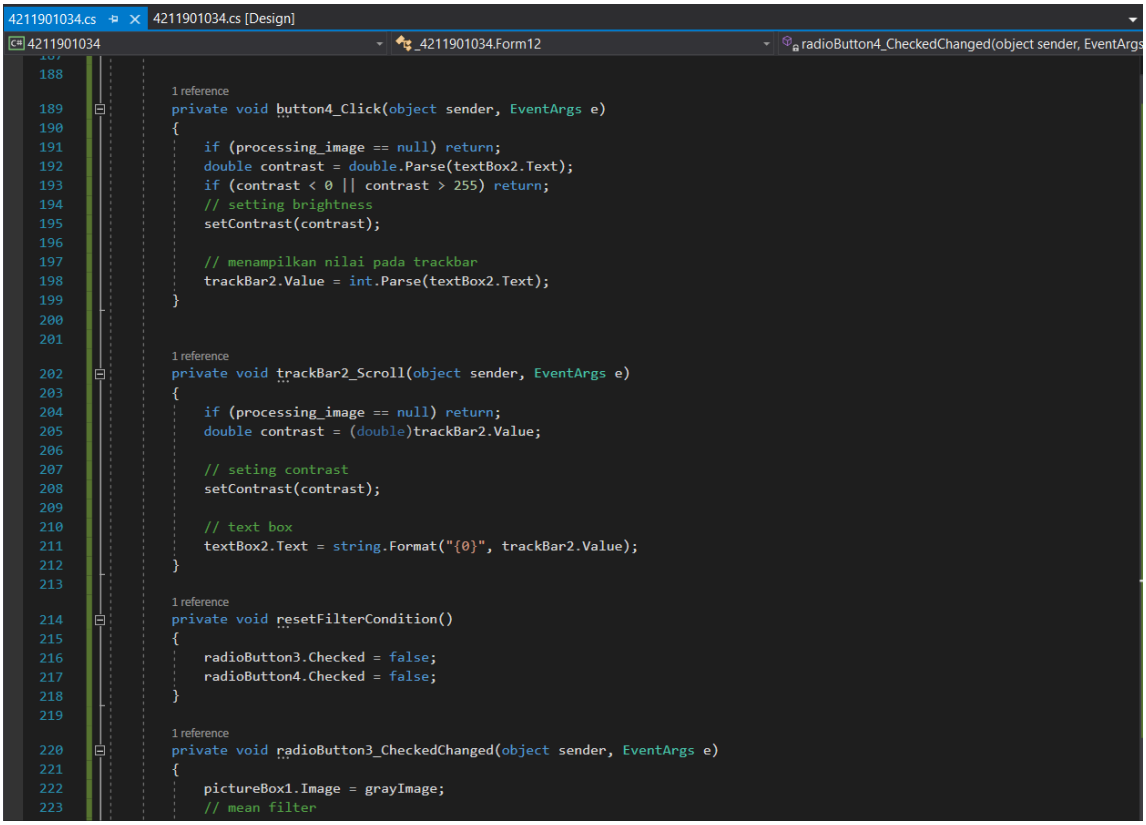
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs

1 reference
private void openFileDialog1_FileOk(object sender, CancelEventArgs e)
{
    source_image = (Bitmap)Bitmap.FromFile(openFileDialog1.FileName);
    pictureBox1.Image = source_image;
}

1 reference
private void button2_Click(object sender, EventArgs e)
{
    Close();
}

2 references
private void setImageProcessing(int proc_number)
{
    for (int x = 0; x < image_width; x++)
    {
        for (int y = 0; y < image_height; y++)
        {
            // get rgb value of the pixel at (x, y)
            Color w = source_image.GetPixel(x, y);

            // gray image && binary image
            if (proc_number == 1 || proc_number == 2)
            {
                int r = w.R;
                int g = w.G;
                int b = w.B;

                int gray_value = (int)(0.5 * r + 0.419 * g + 0.181 * b);

                if (gray_value > 255) gray_value = 255; // karena maks  = 255

                // binary image
                if (proc_number == 2)
                {
```



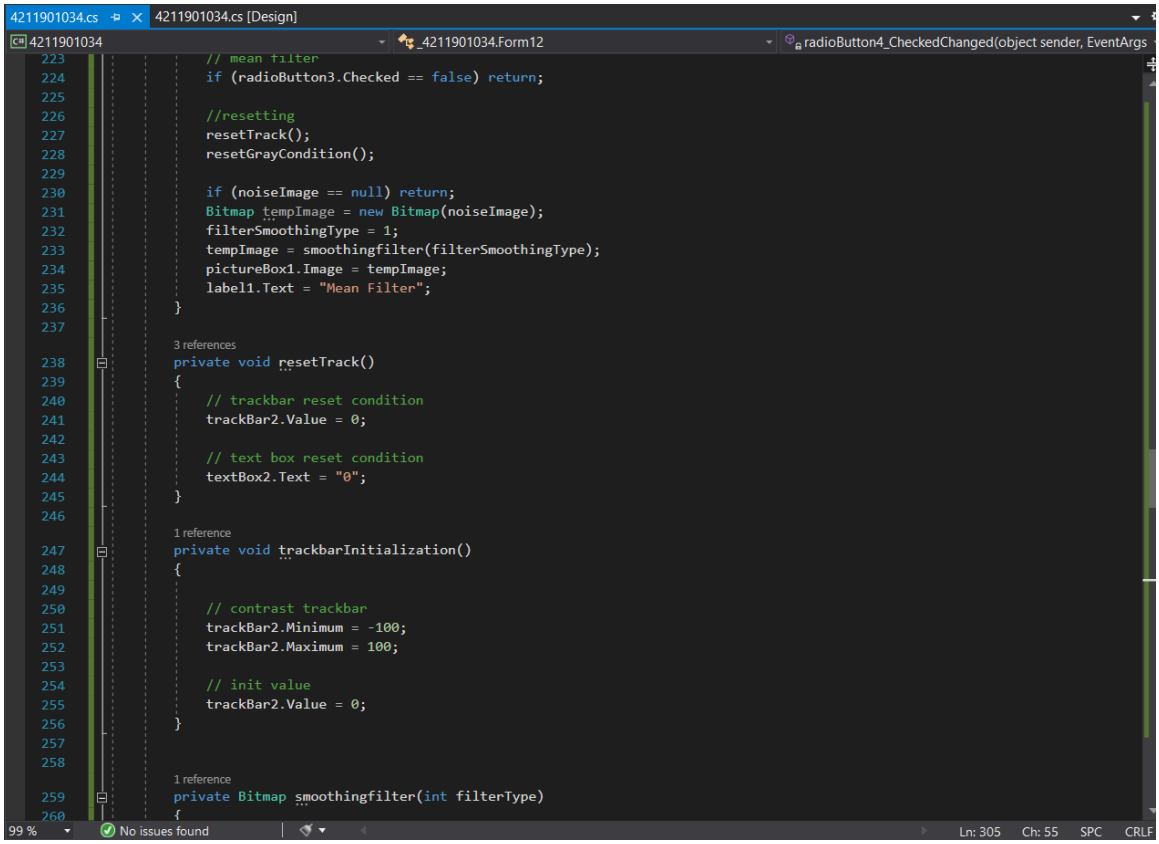
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs

                    int TH = 100;
                    if (gray_value > TH) gray_value = 255;
                    else gray_value = 0;
                }

                Color gray_color = Color.FromArgb(gray_value, gray_value, gray_value);
                processing_image.SetPixel(x, y, gray_color);
            }

        }
    }
    pictureBox1.Image = processing_image;
}

// set brightness

// set contrast
2 references
private void setContrast(double contrast)
{
    Bitmap cImage = new Bitmap(processing_image);

    contrast = (100.0 + contrast) / 100.0;
    contrast *= contrast;

    for (int x = 0; x < image_width; x++)
        for (int y = 0; y < image_height; y++)
        {
            Color w = processing_image.GetPixel(x, y);
            double R = w.R / 255.0;
            R -= 0.5;
            R *= contrast;
            R += 0.5;
            R *= 255;
            if (R > 255) R = 255; if (R < 0) R = 0;

            double G = w.G / 255.0;
            G -= 0.5;
            G *= contrast;
            G += 0.5;
```

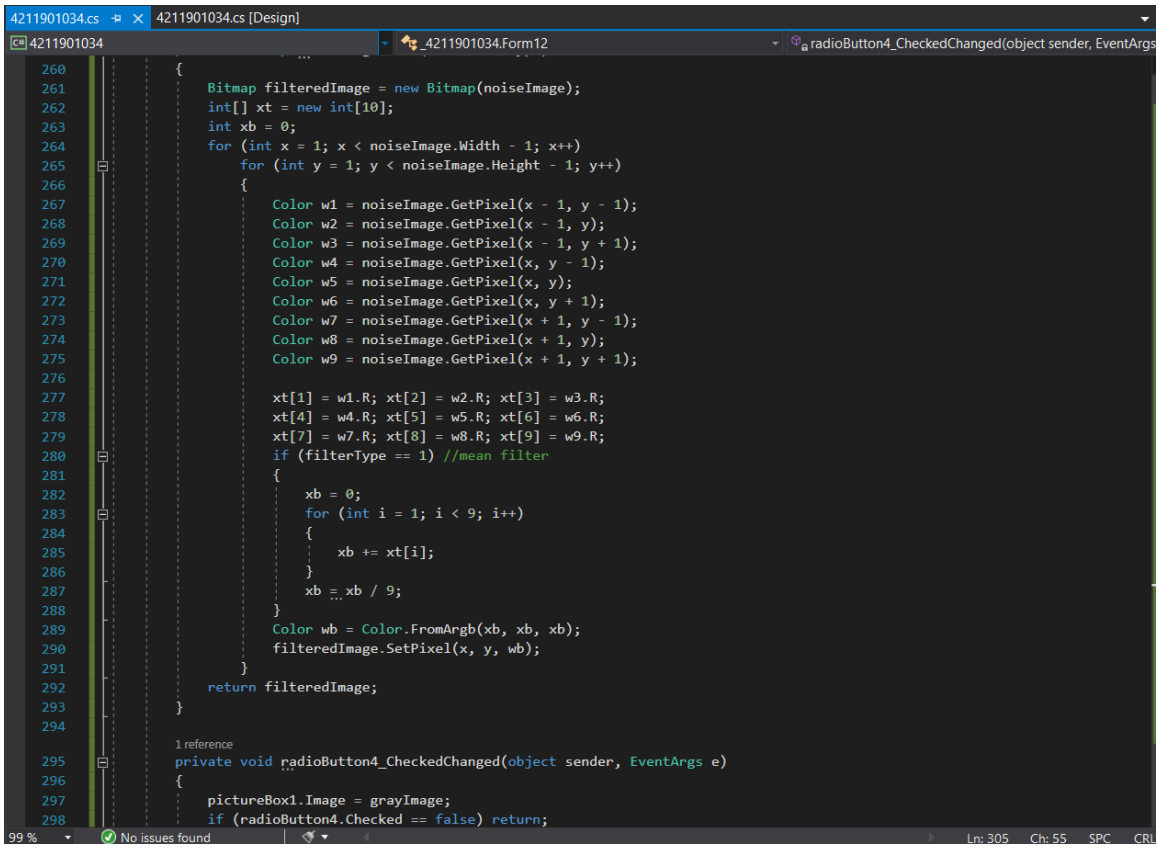


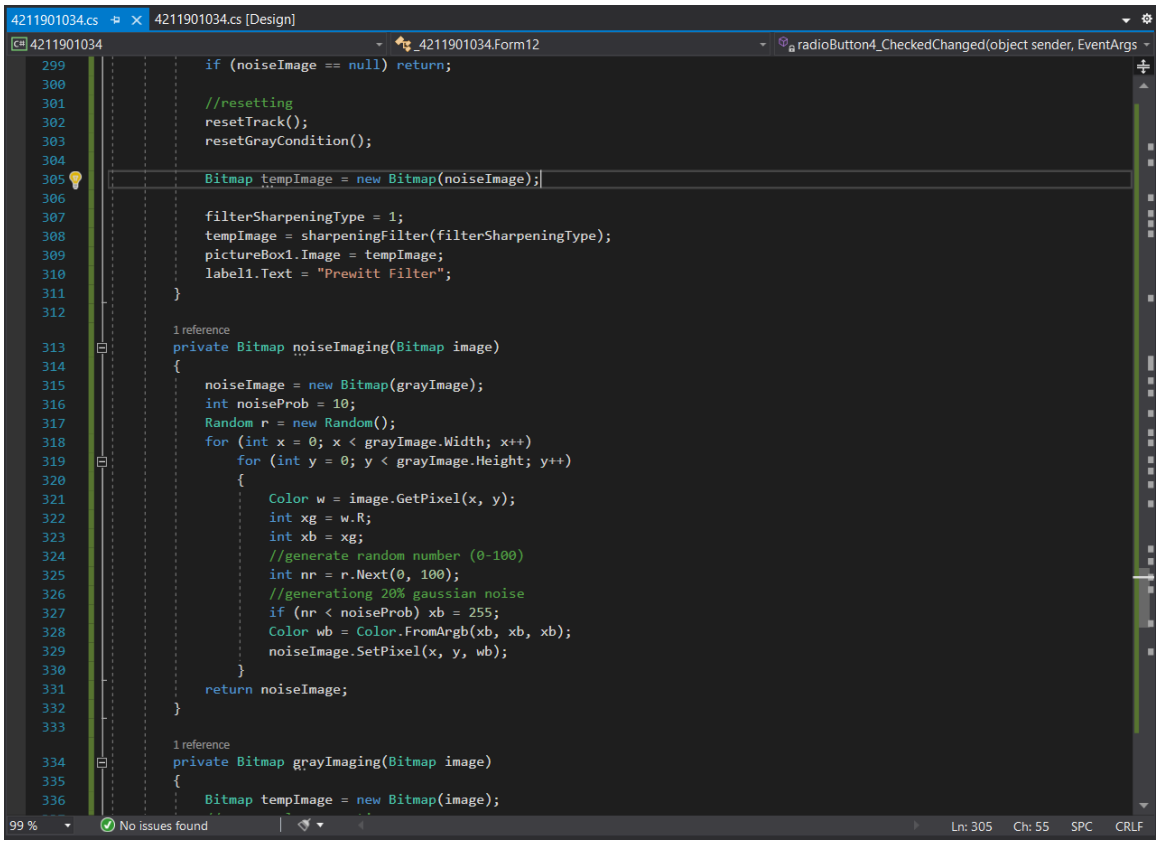
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs
151                     G *= 255;
152                     if (G > 255) G = 255; if (G < 0) G = 0;
153
154                     double B = w.B / 255.0;
155                     B -= 0.5;
156                     B *= contrast;
157                     B += 0.5;
158                     B *= 255;
159                     if (B > 255) B = 255; if (B < 0) B = 0;
160
161                     Color wBaru = Color.FromArgb((byte)R, (byte)G, (byte)B);
162
163                     cImage.SetPixel(x, y, wBaru);
164                 }
165             pictureBox1.Image = cImage;
166         }
167
            1 reference
168         private void label1_Click(object sender, EventArgs e)
169         {
170
171         }
172
            1 reference
173         private void button5_Click(object sender, EventArgs e)
174         {
175             resetGrayCondition();
176             resetFilterCondition();
177
178         }
179
180         // reset condition
            3 references
181         private void resetGrayCondition()
182         {
183             radioButton1.Checked = false;
184             radioButton2.Checked = false;
185         }
186
187
```



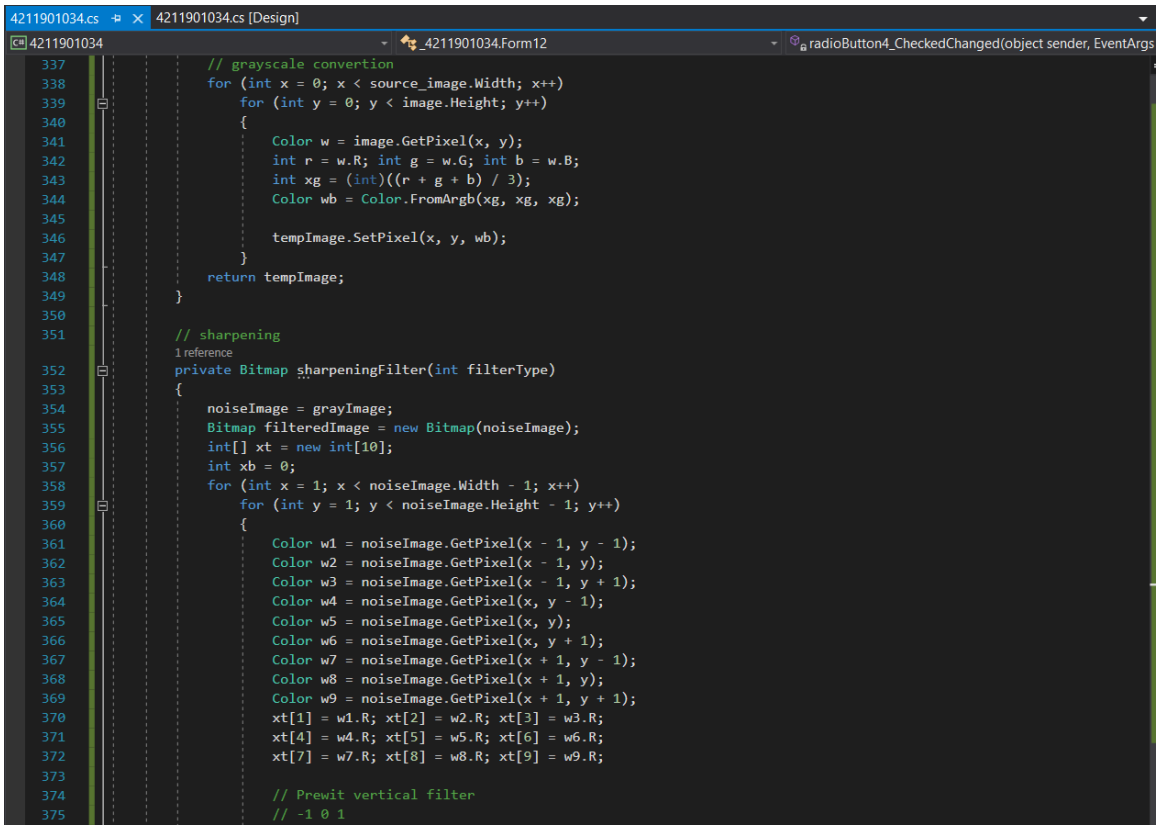
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs
188
            1 reference
189         private void button4_Click(object sender, EventArgs e)
190         {
191             if (processing_image == null) return;
192             double contrast = double.Parse(textBox2.Text);
193             if (contrast < 0 || contrast > 255) return;
194             // setting brightness
195             setContrast(contrast);
196
197             // menampilkan nilai pada trackbar
198             trackBar2.Value = int.Parse(textBox2.Text);
199         }
200
201
            1 reference
202         private void trackBar2_Scroll(object sender, EventArgs e)
203         {
204             if (processing_image == null) return;
205             double contrast = (double)trackBar2.Value;
206
207             // seting contrast
208             setContrast(contrast);
209
210             // text box
211             textBox2.Text = string.Format("{0}", trackBar2.Value);
212         }
213
            1 reference
214         private void resetFilterCondition()
215         {
216             radioButton3.Checked = false;
217             radioButton4.Checked = false;
218         }
219
            1 reference
220         private void radioButton3_CheckedChanged(object sender, EventArgs e)
221         {
222             pictureBox1.Image = grayImage;
223             // mean filter
```


4211901034.cs
4211901034.cs [Design]
4211901034
_4211901034.Form12
radioButton4_CheckedChanged(object sender, EventArgs
// mean filter
if (radioButton3.Checked == false) return;
//resetting
resetTrack();
resetGrayCondition();
if (noiseImage == null) return;
Bitmap tempImage = new Bitmap(noiseImage);
filterSmoothingType = 1;
tempImage = smoothingfilter(filterSmoothingType);
pictureBox1.Image = tempImage;
label1.Text = "Mean Filter";
}
3 references
private void resetTrack()
{
// trackbar reset condition
trackBar2.Value = 0;
// text box reset condition
textBox2.Text = "0";
}
1 reference
private void trackbarInitialization()
{
// contrast trackbar
trackBar2.Minimum = -100;
trackBar2.Maximum = 100;
// init value
trackBar2.Value = 0;
}
1 reference
private Bitmap smoothingfilter(int filterType)
99 %
No issues found
Ln: 305
Ch: 55
SPC
CRLF


4211901034.cs
4211901034.cs [Design]
4211901034
_4211901034.Form12
radioButton4_CheckedChanged(object sender, EventArgs
{
Bitmap filteredImage = new Bitmap(noiseImage);
int[] xt = new int[10];
int xb = 0;
for (int x = 1; x < noiseImage.Width - 1; x++)
for (int y = 1; y < noiseImage.Height - 1; y++)
{
Color w1 = noiseImage.GetPixel(x - 1, y - 1);
Color w2 = noiseImage.GetPixel(x - 1, y);
Color w3 = noiseImage.GetPixel(x - 1, y + 1);
Color w4 = noiseImage.GetPixel(x, y - 1);
Color w5 = noiseImage.GetPixel(x, y);
Color w6 = noiseImage.GetPixel(x, y + 1);
Color w7 = noiseImage.GetPixel(x + 1, y - 1);
Color w8 = noiseImage.GetPixel(x + 1, y);
Color w9 = noiseImage.GetPixel(x + 1, y + 1);
xt[1] = w1.R; xt[2] = w2.R; xt[3] = w3.R;
xt[4] = w4.R; xt[5] = w5.R; xt[6] = w6.R;
xt[7] = w7.R; xt[8] = w8.R; xt[9] = w9.R;
if (filterType == 1) //mean filter
{
xb = 0;
for (int i = 1; i < 9; i++)
{
xb += xt[i];
}
xb = xb / 9;
}
Color wb = Color.FromArgb(xb, xb, xb);
filteredImage.SetPixel(x, y, wb);
}
return filteredImage;
}
1 reference
private void radioButton4_CheckedChanged(object sender, EventArgs e)
{
pictureBox1.Image = grayImage;
if (radioButton4.Checked == false) return;
99 %
No issues found
Ln: 305
Ch: 55
SPC
CRL



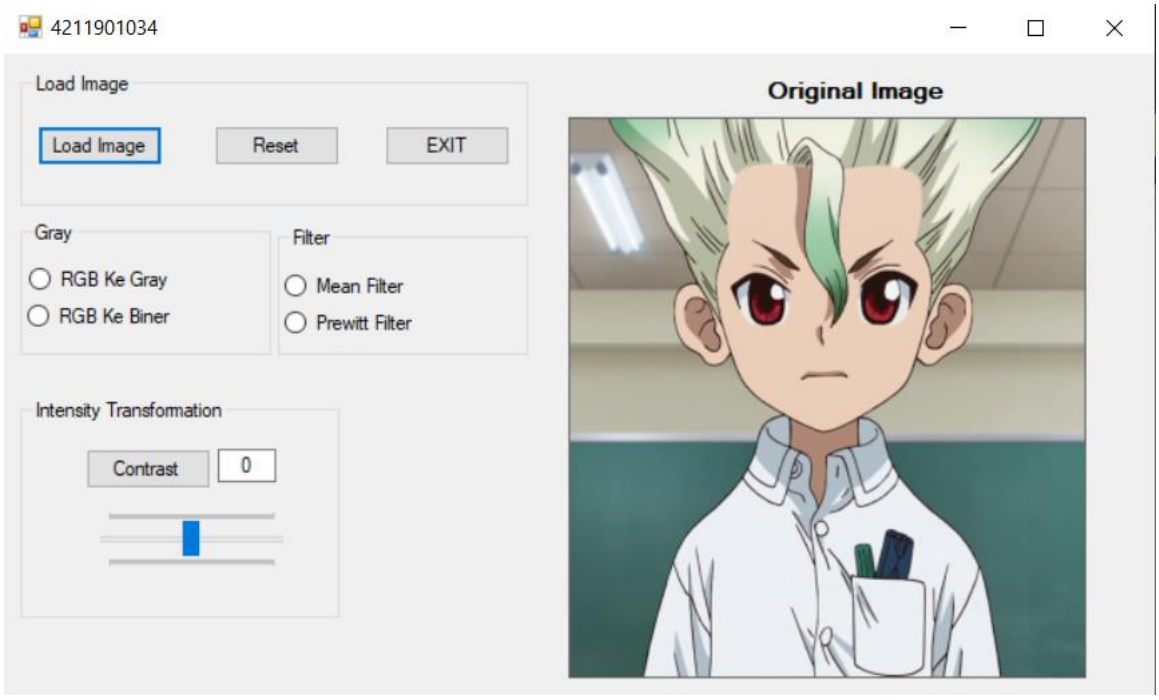
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs
299             if (noiseImage == null) return;
300
301             //resetting
302             resetTrack();
303             resetGrayCondition();
304
305             Bitmap tempImage = new Bitmap(noiseImage);
306
307             filterSharpeningType = 1;
308             tempImage = sharpeningFilter(filterSharpeningType);
309             pictureBox1.Image = tempImage;
310             label1.Text = "Prewitt Filter";
311         }
312
            1 reference
313         private Bitmap noiseImaging(Bitmap image)
314         {
315             noiseImage = new Bitmap(grayImage);
316             int noiseProb = 10;
317             Random r = new Random();
318             for (int x = 0; x < grayImage.Width; x++)
319                 for (int y = 0; y < grayImage.Height; y++)
320                 {
321                     Color w = image.GetPixel(x, y);
322                     int xg = w.R;
323                     int xb = xg;
324                     //generate random number (0-100)
325                     int nr = r.Next(0, 100);
326                     //generationg 20% gaussian noise
327                     if (nr < noiseProb) xb = 255;
328                     Color wb = Color.FromArgb(xb, xb, xb);
329                     noiseImage.SetPixel(x, y, wb);
330                 }
331             return noiseImage;
332         }
333
            1 reference
334         private Bitmap grayImaging(Bitmap image)
335         {
336             Bitmap tempImage = new Bitmap(image);
99 % | No issues found | Ln: 305 | Ch: 55 | SPC | CRLF
```



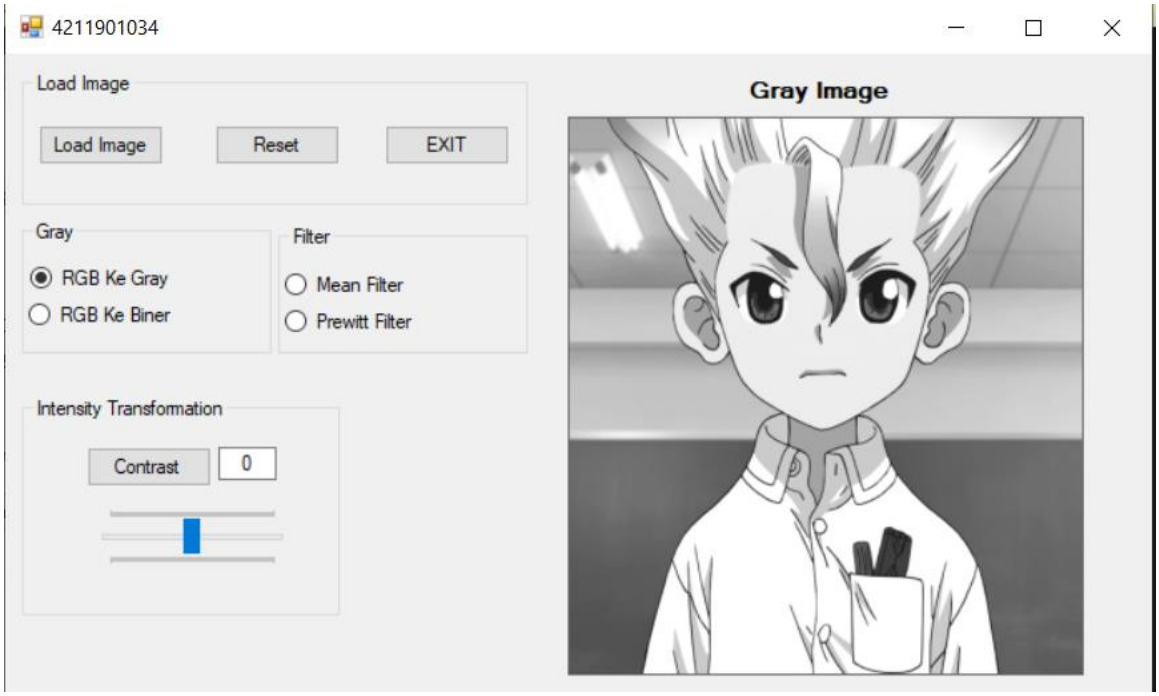
```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs
337             // grayscale convertion
338             for (int x = 0; x < source_image.Width; x++)
339                 for (int y = 0; y < image.Height; y++)
340                 {
341                     Color w = image.GetPixel(x, y);
342                     int r = w.R; int g = w.G; int b = w.B;
343                     int xg = (int)((r + g + b) / 3);
344                     Color wb = Color.FromArgb(xg, xg, xg);
345
346                     tempImage.SetPixel(x, y, wb);
347                 }
348             return tempImage;
349         }
350
351         // sharpening
            1 reference
352         private Bitmap sharpeningFilter(int filterType)
353         {
354             noiseImage = grayImage;
355             Bitmap filteredImage = new Bitmap(noiseImage);
356             int[] xt = new int[10];
357             int xb = 0;
358             for (int x = 1; x < noiseImage.Width - 1; x++)
359                 for (int y = 1; y < noiseImage.Height - 1; y++)
360                 {
361                     Color w1 = noiseImage.GetPixel(x - 1, y - 1);
362                     Color w2 = noiseImage.GetPixel(x - 1, y);
363                     Color w3 = noiseImage.GetPixel(x - 1, y + 1);
364                     Color w4 = noiseImage.GetPixel(x, y - 1);
365                     Color w5 = noiseImage.GetPixel(x, y);
366                     Color w6 = noiseImage.GetPixel(x, y + 1);
367                     Color w7 = noiseImage.GetPixel(x + 1, y - 1);
368                     Color w8 = noiseImage.GetPixel(x + 1, y);
369                     Color w9 = noiseImage.GetPixel(x + 1, y + 1);
370                     xt[1] = w1.R; xt[2] = w2.R; xt[3] = w3.R;
371                     xt[4] = w4.R; xt[5] = w5.R; xt[6] = w6.R;
372                     xt[7] = w7.R; xt[8] = w8.R; xt[9] = w9.R;
373
374                     // Prewit vertical filter
375                     // -1 0 1
```

```
4211901034.cs | 4211901034.cs [Design]
4211901034 | _4211901034.Form12 | radioButton4_CheckedChanged(object sender, EventArgs
365                 Color w5 = noiseImage.GetPixel(x, y);
366                 Color w6 = noiseImage.GetPixel(x, y + 1);
367                 Color w7 = noiseImage.GetPixel(x + 1, y - 1);
368                 Color w8 = noiseImage.GetPixel(x + 1, y);
369                 Color w9 = noiseImage.GetPixel(x + 1, y + 1);
370                 xt[1] = w1.R; xt[2] = w2.R; xt[3] = w3.R;
371                 xt[4] = w4.R; xt[5] = w5.R; xt[6] = w6.R;
372                 xt[7] = w7.R; xt[8] = w8.R; xt[9] = w9.R;
373
374                 // Prewit vertical filter
375                 // -1 0 1
376                 // -1 0 1
377                 // -1 0 1
378                 //
379                 // Prewit horizontal filter
380                 // -1 -1 -1
381                 // 0 0 0
382                 // 1 1 1
383
384                 if (filterType == 1) //Prewitt filter
385                 {
386                     int xh = -1 * xt[1] - 1 * xt[2] - 1 * xt[3] +
387                     0 * xt[4] + 0 * xt[5] + 0 * xt[6] +
388                     1 * xt[7] + 1 * xt[8] + 1 * xt[9];
389                     int xv = -1 * xt[1] + 0 * xt[2] + 1 * xt[3] -
390                     1 * xt[4] + 0 * xt[5] + 1 * xt[6] -
391                     1 * xt[7] + 0 * xt[8] + 1 * xt[9];
392                     xb = xh + xv;
393                     if (xb < 0) xb = 0;
394                     if (xb > 255) xb = 255;
395                 }
396                 Color wb = Color.FromArgb(xb, xb, xb);
397                 filteredImage.SetPixel(x, y, wb);
398             }
399         return filteredImage;
400     }
401 }
402 }
403
```

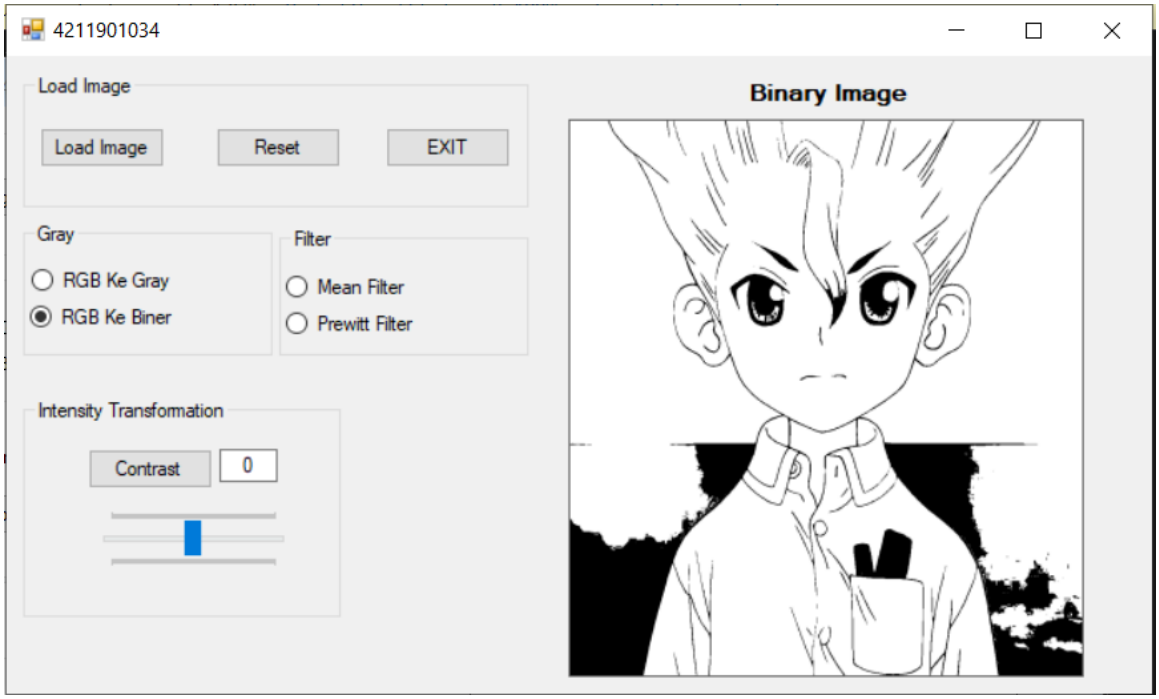
Screenshoot of Image Processing of Each Operation



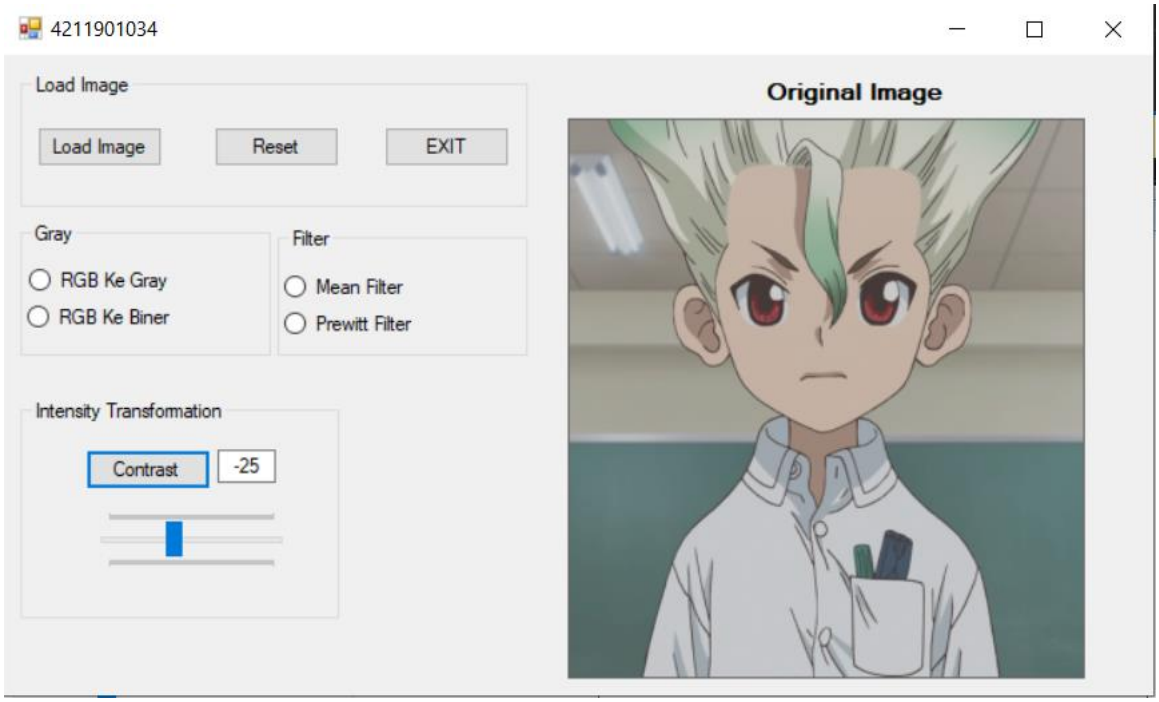
Load Original Image



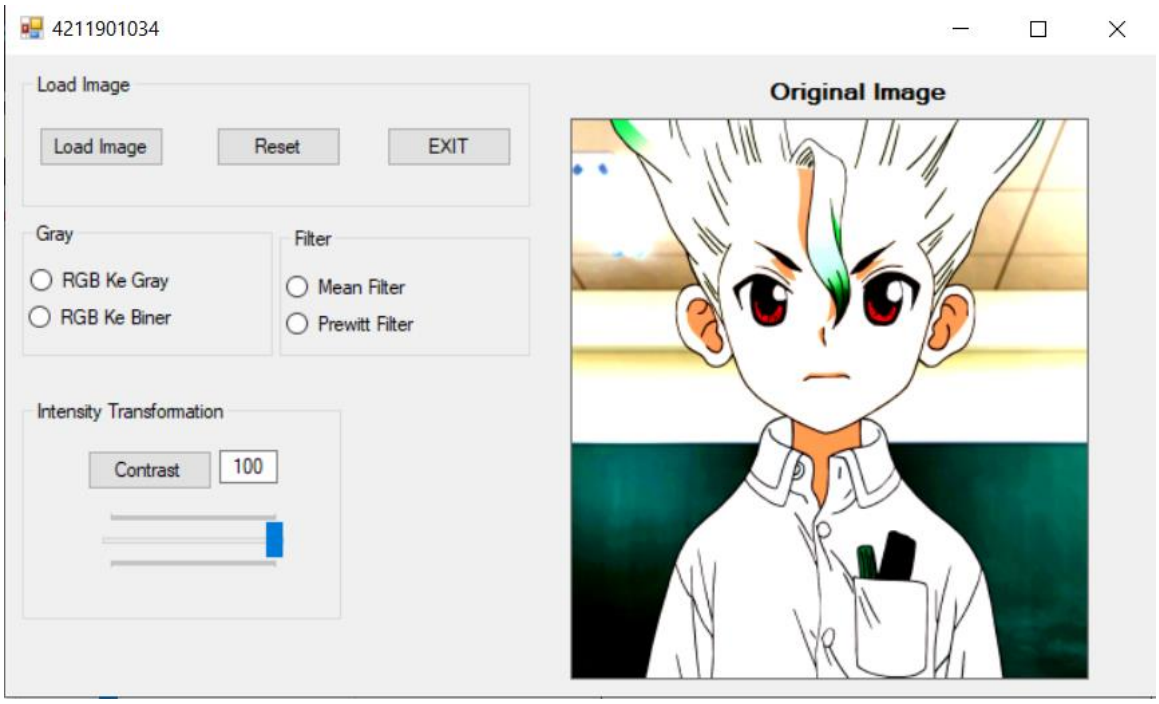
Konversi RGB ke Gray



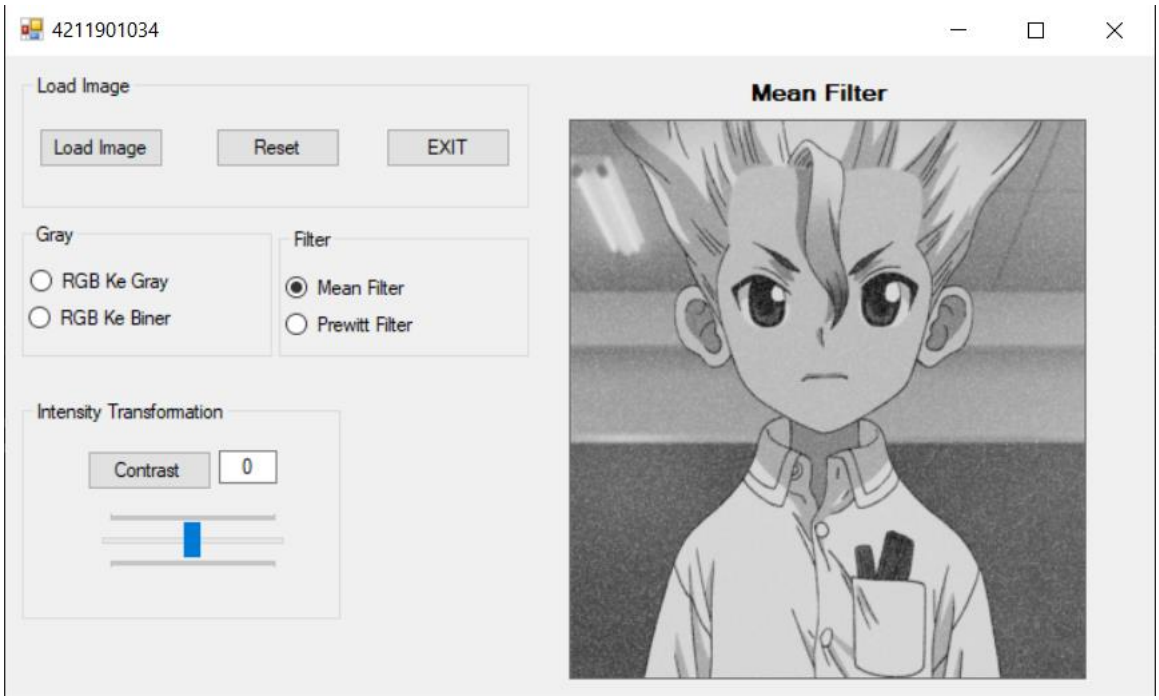
Konversi RGB ke Biner



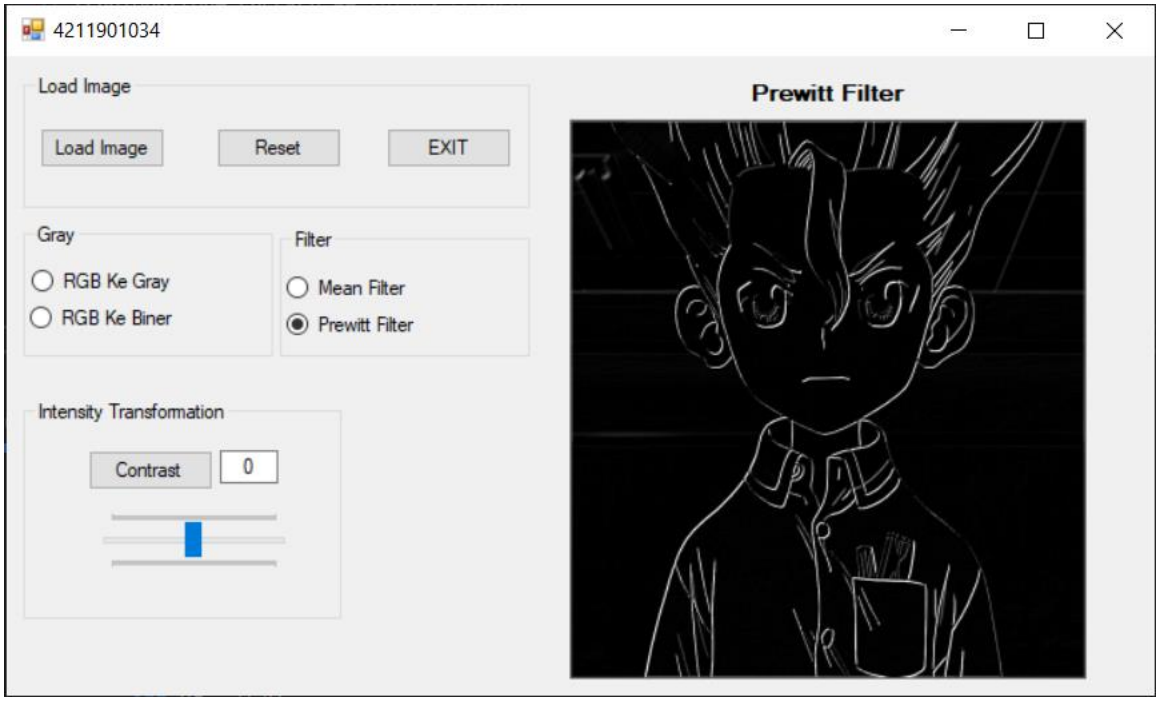
Setting Contrast dengan button



Setting Contrast max value dengan trackbar



Mean Filter



Prewitt Filter