using System;

using System.Collections.Generic;

using System.ComponentModel;

using System.Data;

using System.Drawing;

using System.Linq;

using System.Text;

using System.Windows.Forms;

using System.Collections;

namespace Golf\_Decision\_Tree

{

public partial class Form1 : Form

{

public Form1()

{

InitializeComponent();

}

//variable

DataTable data = new DataTable();

string[] outlook;

string[] temperature;

string[] humidity;

string[] windy;

string[] play;

int row;

private void Form1\_Load(object sender, EventArgs e)

{

data.Columns.Add("Outlook");

data.Columns.Add("Temperature");

data.Columns.Add("Humidity");

data.Columns.Add("Windy");

data.Columns.Add("Play");

data.Rows.Add("sunny", "85", "85", "fale","Don't Play");

data.Rows.Add("sunny", "80", "90", "true", "Don't Play");

data.Rows.Add("overcast", "83", "78", "fale", "Play");

data.Rows.Add("rain", "70", "96", "fale", "Play");

data.Rows.Add("rain", "68", "80", "fale", "Play");

data.Rows.Add("rain", "65", "70", "true", "Don't Play");

data.Rows.Add("overcast", "64", "65", "true", "Play");

data.Rows.Add("sunny", "72", "95", "fale", "Don't Play");

data.Rows.Add("sunny", "69", "70", "fale", "Play");

data.Rows.Add("rain", "75", "80", "fale", "Play");

data.Rows.Add("sunny", "75", "70", "true", "Play");

data.Rows.Add("overcast", "72", "90", "fale", "Play");

data.Rows.Add("overcast", "81", "75", "fale", "Play");

data.Rows.Add("rain", "71", "80", "true", "Don't Play");

dataGridView1.DataSource = data;

groupBox4.Enabled = false;

panel1.Visible = false;

panel2.Visible = false;

panel3.Visible = false;

label6.Visible = false;

label7.Visible = false;

label8.Visible = false;

label9.Visible = false;

label10.Visible = false;

label11.Visible = false;

label12.Visible = false;

textBox4.Visible = false;

textBox5.Visible = false;

textBox6.Visible = false;

textBox7.Visible = false;

textBox8.Visible = false;

textBox9.Visible = false;

textBox10.Visible = false;

lineShape1.Visible = false;

lineShape2.Visible = false;

lineShape3.Visible = false;

lineShape4.Visible = false;

lineShape5.Visible = false;

lineShape6.Visible = false;

lineShape7.Visible = false;

}

//build tree

private void button2\_Click(object sender, EventArgs e)

{

panel1.Visible = true;

panel3.Visible = true;

row = dataGridView1.Rows.Count;

outlook = new string[row];

temperature = new string[row];

humidity = new string[row];

windy = new string[row];

play = new string[row];

for (int i = 0; i < row; i++)

{

outlook[i] = Convert.ToString(dataGridView1.Rows[i].Cells[0].Value);

temperature[i] = Convert.ToString(dataGridView1.Rows[i].Cells[1].Value);

humidity[i] = Convert.ToString(dataGridView1.Rows[i].Cells[2].Value);

windy[i] = Convert.ToString(dataGridView1.Rows[i].Cells[3].Value);

play[i] = Convert.ToString(dataGridView1.Rows[i].Cells[4].Value);

}

textBox2.Text = "Calculate root";

timer1.Enabled = true;

}

//check

private void button1\_Click(object sender, EventArgs e)

{

if (Outlook.SelectedIndex ==0)

{

if (int.Parse(Humidity.Text.ToString()) <= 70)

{

ans.Text = "Play";

ans.BackColor = Color.Green;

}

else if (int.Parse(Humidity.Text.ToString()) > 70)

{

ans.Text = "Don't Play";

ans.BackColor = Color.Red;

}

}

else if (Outlook.SelectedIndex == 1)

{

ans.Text = "Play";

ans.BackColor = Color.Green;

}

else if (Outlook.SelectedIndex == 2)

{

if (Windy.SelectedIndex == 1)

{

ans.Text = "Play";

ans.BackColor = Color.Green;

}

else if (Windy.SelectedIndex == 0)

{

ans.Text = "Don't Play";

ans.BackColor = Color.Red;

}

}

}

private void timer1\_Tick(object sender, EventArgs e)

{

timer1.Enabled=false;

double a1, b1, c1, d1, e1;

a1 = entropy();

b1 = outlook\_gain();

c1 = temperature\_gain();

d1 = humidity\_gain();

e1 = windy\_gain();

textBox2.Text += "\r\n outlook\_gain = " + b1;

textBox2.Text += "\r\n temperature\_gain = " + c1;

textBox2.Text += "\r\n humidity\_gain = " + d1;

textBox2.Text += "\r\n windy\_gain = " + e1;

if (b1 > c1 && b1 > d1 && b1 > e1)

{

textBox2.Text += "\r\nRoot = outlook";

textBox3.Text = "Outlook";

}

else if(c1 > b1 && c1 > d1 && c1 > e1)

{

textBox2.Text += "\r\nRoot = temperature";

textBox3.Text = "Temperature";

}

else if(d1 > b1 && d1 > c1 && d > e1)

{

textBox2.Text += "\r\nRoot = humidity";

textBox3.Text = "Humidity";

}

else if (e1 > b1 && e1 > c1 && e1 > d1)

{

textBox2.Text += "\r\nRoot = windy";

textBox3.Text = "Windy";

}

label6.Visible = true;

label7.Visible = true;

label8.Visible = true;

textBox4.Visible = true;

textBox5.Visible = true;

textBox6.Visible = true;

lineShape1.Visible = true;

lineShape2.Visible = true;

lineShape7.Visible = true;

textBox6.Text = "Play";

textBox2.Text += "\r\nCalculate subroot";

timer2.Enabled = true;

}

private void timer2\_Tick(object sender, EventArgs e)

{

timer2.Enabled = false;

double a2, b2, c2, d2;

a2 = entropy2();

b2 = temperature\_gain2();

c2 = humidity\_gain2();

d2 = windy\_gain2();

textBox2.Text += "\r\n temperature\_gain = " + b2;

textBox2.Text += "\r\n humidity\_gain = " + c2;

textBox2.Text += "\r\n windy\_gain = " + d2;

if (b2 > c2 && b2 > d2 )

{

textBox2.Text += "\r\nRoot = temperature";

textBox4.Text = "Temperature";

}

else if (c2 > d2 && c2 > b2)

{

textBox2.Text += "\r\nRoot = humidity";

textBox4.Text = "Humidity";

}

else if (d2 > b2 && d2 > c2)

{

textBox2.Text += "\r\nRoot = windy";

textBox4.Text = "Windy";

}

label9.Visible = true;

label10.Visible = true;

textBox7.Visible = true;

textBox8.Visible = true;

lineShape3.Visible = true;

lineShape4.Visible = true;

textBox7.Text = "Play";

textBox8.Text = "Don't play";

textBox2.Text += "\r\nCalculate subroot";

timer3.Enabled = true;

}

private void timer3\_Tick(object sender, EventArgs e)

{

timer3.Enabled = false;

double a3, b3, c3, d3, e3;

a3 = entropy3();

b3 = temperature\_gain3();

c3 = windy\_gain3();

textBox2.Text += "\r\n temperature\_gain = " + b3;

textBox2.Text += "\r\n windy\_gain = " + c3;

if (b3 > c3)

{

textBox2.Text += "\r\nRoot = temperature";

textBox5.Text = "temperature";

}

else if (c3 > b3)

{

textBox2.Text += "\r\nRoot = windy";

textBox5.Text = "Windy";

}

label11.Visible = true;

label12.Visible = true;

textBox9.Visible = true;

textBox10.Visible = true;

lineShape5.Visible = true;

lineShape6.Visible = true;

textBox9.Text = "Play";

textBox10.Text = "Don't play";

panel2.Visible = true;

groupBox4.Enabled = true;

}

//หาค่าเอนโทรปี

double e;

double p, d;

double entropy()

{

for (int i = 0; i < row; i++)

{

if (play[i] == "Play")

{

p++;

}

else if (play[i] == "Don't Play")

{

d++;

}

}

e = ((-p / row) \* ((Math.Log10(p / row))/Math.Log10(2)))+((-d / row) \* ((Math.Log10(d / row))/Math.Log10(2)));

return e;

}

//หาค่าเกนของoutlook

double s, o, r, goutlook;

double sp, op, rp, sd, od, rd;

double outlook\_gain()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "sunny")

{

s++;

if (play[i] == "Play")

{

sp++;

}

else if (play[i] == "Don't Play")

{

sd++;

}

}

else if (outlook[i] == "overcast")

{

o++;

if (play[i] == "Play")

{

op++;

}

else if (play[i] == "Don't Play")

{

od++;

}

}

else if (outlook[i] == "rain")

{

r++;

if (play[i] == "Play")

{

rp++;

}

else if (play[i] == "Don't Play")

{

rd++;

}

}

}

goutlook = e - ((s / row \* (((-sp / s) \* ((Math.Log10(sp / s)) / Math.Log10(2))) + ((-sd / s) \* ((Math.Log10(sd / s)) / Math.Log10(2))))) +

(o / row \* (((-op / o) \* ((Math.Log10(op / o)) / Math.Log10(2))))) +

(r / row \* (((-rp / r) \* ((Math.Log10(rp / r)) / Math.Log10(2))) + ((-rd / r) \* ((Math.Log10(rd / r)) / Math.Log10(2))))));

return goutlook;

}

//หาค่าเกนของtemperature

double t1, t2, gtemperature;

double t1p, t2p, t1d, t2d;

double temperature\_gain()

{

for (int i = 0; i < row; i++)

{

//temperature

if (int.Parse(temperature[i]) <=70 )

{

t1++;

if (play[i] == "Play")

{

t1p++;

}

else if (play[i] == "Don't Play")

{

t1d++;

}

}

else if (int.Parse(temperature[i]) > 70)

{

t2++;

if (play[i] == "Play")

{

t2p++;

}

else if (play[i] == "Don't Play")

{

t2d++;

}

}

}

gtemperature = e - ((t1 / row \* (((-t1p / t1) \* ((Math.Log10(t1p / t1)) / Math.Log10(2))) + ((-t1d / t1) \* ((Math.Log10(t1d / t1)) / Math.Log10(2))))) +

(t2 / row \* (((-t2p / t2) \* ((Math.Log10(t2p / t2)) / Math.Log10(2))) + ((-t2d / t2) \* ((Math.Log10(t2d / t2)) / Math.Log10(2))))));

return gtemperature;

}

//หาค่าเกนของhumidity

double h1, h2, ghumidity;

double h1p, h2p, h1d, h2d;

double humidity\_gain()

{

for (int i = 0; i < row; i++)

{

//humidity

if (int.Parse(humidity[i]) <= 70)

{

h1++;

if (play[i] == "Play")

{

h1p++;

}

else if (play[i] == "Don't Play")

{

h1d++;

}

}

else if (int.Parse(humidity[i]) > 70)

{

h2++;

if (play[i] == "Play")

{

h2p++;

}

else if (play[i] == "Don't Play")

{

h2d++;

}

}

}

ghumidity = e - ((h1 / row \* (((-h1p / t1) \* ((Math.Log10(h1p / h1)) / Math.Log10(2))) + ((-h1d / h1) \* ((Math.Log10(h1d / h1)) / Math.Log10(2))))) +

(h2 / row \* (((-h2p / h2) \* ((Math.Log10(h2p / h2)) / Math.Log10(2))) + ((-h2d / h2) \* ((Math.Log10(h2d / h2)) / Math.Log10(2))))));

return ghumidity;

}

//หาค่าเกนของwindy

double t, f, gwindy;

double tp, fp, td, fd;

double windy\_gain()

{

for (int i = 0; i < row; i++)

{

//windy

if (windy[i] == "true")

{

t++;

if (play[i] == "Play")

{

tp++;

}

else if (play[i] == "Don't Play")

{

td++;

}

}

else if (windy[i] == "fale")

{

f++;

if (play[i] == "Play")

{

fp++;

}

else if (play[i] == "Don't Play")

{

fd++;

}

}

}

gwindy = e - ((t / row \* (((-tp / t) \* ((Math.Log10(tp / t)) / Math.Log10(2))) + ((-td / t) \* ((Math.Log10(td / t)) / Math.Log10(2))))) +

(f / row \* (((-fp / f) \* ((Math.Log10(fp / f)) / Math.Log10(2))) + ((-fd / f) \* ((Math.Log10(fd / f)) / Math.Log10(2))))));

return gwindy;

}

//หาค่าเอนโทรปี2

double e2, c2;

double p2, d2;

double entropy2()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "sunny")

{

c2++;

if (play[i] == "Play")

{

p2++;

}

else if (play[i] == "Don't Play")

{

d2++;

}

}

}

e2 = ((-p2 / c2) \* ((Math.Log10(p2 / c2)) / Math.Log10(2))) + ((-d2 / c2) \* ((Math.Log10(d2 / c2)) / Math.Log10(2)));

return e2;

}

//หาค่าเกนของtemperature2

double t12, t22, gtemperature2;

double t1p2, t2p2, t1d2, t2d2;

double temperature\_gain2()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "sunny")

{

//temperature

if (int.Parse(temperature[i]) <= 70)

{

t12++;

if (play[i] == "Play")

{

t1p2++;

}

else if (play[i] == "Don't Play")

{

t1d2++;

}

}

else if (int.Parse(temperature[i]) > 70)

{

t22++;

if (play[i] == "Play")

{

t2p2++;

}

else if (play[i] == "Don't Play")

{

t2d2++;

}

}

}

}

gtemperature2 = e2 - ((t12 / c2 \* (((-t1p2 / t12) \* ((Math.Log10(t1p2 / t12)) / Math.Log10(2))))) +

(t22 / c2 \* (((-t2p2 / t22) \* ((Math.Log10(t2p2 / t22)) / Math.Log10(2))) + ((-t2d2 / t22) \* ((Math.Log10(t2d2 / t22)) / Math.Log10(2))))));

return gtemperature2;

}

//หาค่าเกนของhumidity2

double h12, h22, ghumidity2;

double h1p2, h2p2, h1d2, h2d2;

double humidity\_gain2()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "sunny")

{

//humidity

if (int.Parse(humidity[i]) <= 70)

{

h12++;

if (play[i] == "Play")

{

h1p2++;

}

else if (play[i] == "Don't Play")

{

h1d2++;

}

}

else if (int.Parse(humidity[i]) > 70)

{

h22++;

if (play[i] == "Play")

{

h2p2++;

}

else if (play[i] == "Don't Play")

{

h2d2++;

}

}

}

}

ghumidity2 = e2 - ((h12 / c2 \* (((-h1p2 / h12) \* ((Math.Log10(h1p2 / h12)) / Math.Log10(2))))) +

(h22 / c2 \* (((-h2d2 / h22) \* ((Math.Log10(h2d2 / h22)) / Math.Log10(2))))));

return ghumidity2;

}

//หาค่าเกนของwindy2

double tt2, ff2, gwindy2;

double tp2, fp2, td2, fd2;

double windy\_gain2()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "sunny")

{

//windy

if (windy[i] == "true")

{

tt2++;

if (play[i] == "Play")

{

tp2++;

}

else if (play[i] == "Don't Play")

{

td2++;

}

}

else if (windy[i] == "fale")

{

ff2++;

if (play[i] == "Play")

{

fp2++;

}

else if (play[i] == "Don't Play")

{

fd2++;

}

}

}

}

gwindy2 = e2 - ((tt2 / c2 \* (((-tp2 / tt2) \* ((Math.Log10(tp2 / tt2)) / Math.Log10(2))) + ((-td2 / tt2) \* ((Math.Log10(td2 / tt2)) / Math.Log10(2))))) +

(ff2 / c2 \* (((-fp2 / ff2) \* ((Math.Log10(fp2 / ff2)) / Math.Log10(2))) + ((-fd2 / ff2) \* ((Math.Log10(fd2 / ff2)) / Math.Log10(2))))));

return gwindy2;

}

//หาค่าเอนโทรปี3

double e3, c3;

double p3, d3;

double entropy3()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "rain")

{

c3++;

if (play[i] == "Play")

{

p3++;

}

else if (play[i] == "Don't Play")

{

d3++;

}

}

}

e3 = ((-p3 / c3) \* ((Math.Log10(p3 / c3)) / Math.Log10(2))) + ((-d3 / c3) \* ((Math.Log10(d3 / c3)) / Math.Log10(2)));

return e3;

}

//หาค่าเกนของtemperature3

double t13, t23, gtemperature3;

double t1p3, t2p3, t1d3, t2d3;

double temperature\_gain3()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "rain")

{

//temperature

if (int.Parse(temperature[i]) <= 70)

{

t13++;

if (play[i] == "Play")

{

t1p3++;

}

else if (play[i] == "Don't Play")

{

t1d3++;

}

}

else if (int.Parse(temperature[i]) > 70)

{

t23++;

if (play[i] == "Play")

{

t2p3++;

}

else if (play[i] == "Don't Play")

{

t2d3++;

}

}

}

}

gtemperature3 = e3 - ((t13 / c3 \* (((-t1p3 / t13) \* ((Math.Log10(t1p3 / t13)) / Math.Log10(2))) + ((-t1d3 / t13) \* ((Math.Log10(t1d3 / t13)) / Math.Log10(2))))) +

(t23 / c3 \* (((-t2p3 / t23) \* ((Math.Log10(t2p3 / t23)) / Math.Log10(2))) + ((-t2d3 / t23) \* ((Math.Log10(t2d3 / t23)) / Math.Log10(2))))));

return gtemperature3;

}

//หาค่าเกนของwindy3

double tt3, ff3, gwindy3;

double tp3, fp3, td3, fd3;

double windy\_gain3()

{

for (int i = 0; i < row; i++)

{

if (outlook[i] == "rain")

{

//windy

if (windy[i] == "true")

{

tt3++;

if (play[i] == "Play")

{

tp3++;

}

else if (play[i] == "Don't Play")

{

td3++;

}

}

else if (windy[i] == "fale")

{

ff3++;

if (play[i] == "Play")

{

fp3++;

}

else if (play[i] == "Don't Play")

{

fd3++;

}

}

}

}

gwindy3 = e3 - ((tt3 / c3 \* (((-td3 / tt3) \* ((Math.Log10(td3 / tt3)) / Math.Log10(2))))) +

(ff3 / c3 \* (((-fp3 / ff3) \* ((Math.Log10(fp3 / ff3)) / Math.Log10(2))))));

return gwindy3;

}

}

}