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附錄 A、系統程式碼

附錄 A-1 自動下載器程式碼

```
//-------------------------------------------------------------------------------------
public class urlException extends HttpServlet {
    //---------------------------------------------------------------------------------
    protected void doGet(HttpServletRequest request, HttpServletResponse response)
    throws ServletException, IOException {

        response.setContentType("text/html;charset=big5");
        PrintWriter printWriter = response.getWriter();
        int[] ia_company = new int[]{1101,...,9945};
        String[] s_fileName = new String[]{"財務分析","財務資料","損益表".....};

        for(int j=0; j<ia_company.length; j++){
            for(int i=0; i<i_year; i++){
                String []sa_url = new String[]{"http://mops.tse.com.tw/.....",.....};
                String s_url = sa_url[i_file];
                String s_saveUrl = "儲存之路徑";

                try {
                    getURLFile(new URL(s_url),s_saveUrl);
                }
                catch(MalformedURLException e){printWriter.println("URL 位址錯誤!");}
            }
        }
    }
    //---------------------------------------------------------------------------------
    public static void getURLFile(URL url, String s_saveUrl) throws IOException{

        DataInputStream in = new DataInputStream(url.openStream());
        RandomAccessFile out = new RandomAccessFile(s_saveUrl,"rw");

        try{
            while(true){
                data=(byte)in.readByte();
                out.writeByte(data);
            }
        }
        catch(Exception e){}
        in.close();
        out.close();
    }
}
//-------------------------------------------------------------------------------------
```

附錄A-2 知識萃取程式碼

```
//-------------------------------------------------------------------------------------
private void knowledgeExtraction(int i_company, String[]sa_knoExt, int i_year)
{
     FileInfo fi_total = new FileInfo("資料路徑");
     FileStream fs_total  = fi_total.Open(FileMode.Open);
     StreamReader sr_total  = new StreamReader(fs_total , System.Text.Encoding.Default);

     string s_readLine;
     while(sr_total.Peek() !=-1)
     {
          s_readLine=sr_total.ReadLine();
          if(符合萃取條件)
               sa_knoExt[i]=知識片段;
          else
               sa_knoExt[i]="";
     }
     fs_total.Close();
     sr_total.Close();
}
//-------------------------------------------------------------------------------------
private void knowledgeSave(int i_company, String[]sa_knoExt, int i_year)
{
     string XmlPath= "儲存位址";
     DS_KnoExtCom.ReadXml(XmlPath);
     DataRow dr_company = DS_KnoExtCom.Tables["Company"].NewRow();

     dr_company [sa_comItems[0]]=時期;
     for(int i=1; i<=萃取數量; i++)
          dr_company [sa_comItems[i]]=sa_knoExt[i];

     DS_KnoExtCom.Tables["Company"].Rows.Add(dr_company);
     DS_KnoExtCom.WriteXml(XmlPath);
     DS_KnoExtCom.Clear();
}
//-------------------------------------------------------------------------------------
public void comKnoExt(int i_year)
{
     String[] sa_knoExt = new String[萃取數];
     for(int i=0; i<萃取期; i++)
     {
          for(int j=0; j<企業數; j++)
          {
               knowledgeExtraction(i_comNo[j], sa_knoExt, i_year);
               knowledgeSave(i_comNo[j], sa_knoExt, i_year);
          }
     }
}
//-------------------------------------------------------------------------------------
```

附錄A-3 資料資訊化(MA)程式碼

```
//-------------------------------------------------------------------------------------------
public double getMA(double[] P,int n)
{
     double d_sum=0;
     for(int i=0;i<n;i++)
     {
          d_sum+=P[i];
     }
     return d_sum/n;
}
//-------------------------------------------------------------------------------------------
public void maInformation(int i_infoNO, int i_dataNO)
{
     DataSet DS = new DataSet();
     DataSet DS_Save = new DataSet();
     //來源檔匯入-----------------------------------------------
     string XmlPath="資料來源路徑";
     DS.ReadXml(XmlPath);
     //輸出檔匯入-----------------------------------------------
     string XmlPath_Save="資訊儲存路徑";
     DS_Save.ReadXml(XmlPath_Save);

     //區域變數宣告---------------------------------------------
     double[] ds_MAData = new double[250];
     int[] is_MANum = new int[]{5,20,60,125,250};
     string[] sa_MAItem = new String[]{"MA_5","MA_20","MA_60","MA_125","MA_250"};

     for(int i=i_infoNO; i<=i_dataNO; i++)
     {
          for(int j=0; j<250; j++)
               ds_MAData[j]=交易資料;

          DataRow dr =  DS_Save.Tables["MA"].NewRow();
          dr["Num"]=i;
          for(int k=0; k<5; k++)
               dr[sa_MAItem[k]]=indexFunction.getMA(ds_MAData,is_MANum[k]);
          DS_Save.Tables["MA"].Rows.Add(dr);
          DS_Save.WriteXml(XmlPath_Save);
     }
     DS.Clear();
     DS_Save.Clear();
}
//-------------------------------------------------------------------------------------------
```

附錄A-4 資訊知識化(MA)程式碼

```
//-------------------------------------------------------------------------------------
public void maKnowledge(int i_KnowNO, int i_infoNO)
{
     string XmlPath_Save="儲存路徑";
     DS_Save.ReadXml(XmlPath_Save);
     ds_DAT.ReadXml("交易資料路徑");
     ds_INF.ReadXml("MA指標路徑");

     string[] sa_MAItem = new
              string[]{"MA1","MA2","MA3","MA4","MA5","MA6","MA7","MA8","MA9","MA10"};

     for(int i=i_KnowNO; i<=i_infoNO; i++)
     {
          knowledgeRule.getMAKnowledge(ia_Knowledge, i, ds_DAT, ds_INF);

          DataRow dr =  DS_Save.Tables["MA"].NewRow();
          dr["Num"]=i;
          for(int k=0; k<知識數; k++)
               dr[sa_MAItem[k]]=ia_Knowledge[k];
          DS_Save.Tables["MA"].Rows.Add(dr);
          DS_Save.WriteXml(XmlPath_Save);
     }
}
//-------------------------------------------------------------------------------------
public void getMAKnowledge(int[] ia_MAKnowledge, int i_infoNO, DataSet ds_DAT, DataSet ds_INF)
{
     //變數宣告-----------------------------------------------------------------------
     double price,price_1;
     double MA_5,MA_5_1,MA_5_5,MA_20,MA_60,MA_250,MA_20_1,MA_250_1;
     //資料資訊擷取-------------------------------------------------------------------
     MA_5=Convert.ToDouble(ds_INF.Tables["MA"].Rows[i_infoNO][1].ToString());
     MA_5_5=Convert.ToDouble(ds_INF.Tables["MA"].Rows[i_infoNO-5][1].ToString());
     ……
     price_1=Convert.ToDouble(ds_DAT.Tables["Index"].Rows[i_infoNO-1][3].ToString());

     for(int i=0; i<知識數; i++)
          ia_MAKnowledge[i]=0;

     //法則判斷-----------------------------------------------------------------------
     //MA之買訊-----------------------------------------------------------------------
     if((price/MA_5)>e_KeyWordDefine.BREAK) && (MA_5_5/MA_5_1)>e_KeyWordDefine.RISE))
          ia_MAKnowledge[0]=1;                                          //突破之買進訊號
     if((MA_20 > MA_20_1) && (price > MA_20) && (MA_20_1 > price_1))
          ia_MAKnowledge[1]=1;                                          //上整之買進訊號
     if((price_1>MA_5_1) && MA_5>MA_5_1) && (price_1<price) && MA_5_1>MA_60)
          ia_MAKnowledge[2]=1;                                          //強勢之買進訊號
     if((price_1 < MA_5_1) && ((MA_5_5/MA_5)> e_KeyWordDefine.SLUMP)
          ia_MAKnowledge[3]=1;                                          //超跌之買進訊號
     if((MA_20_1<MA_250_1) && (MA_20>MA_250))
          ia_MAKnowledge[4]=1;                                          //黃金交叉之買訊
     //MA之賣訊-----------------------------------------------------------------------
     ……
}
//-------------------------------------------------------------------------------------
```

附錄A-5 知識智能化程式碼

```
//-------------------------------------------------------------------------------------
public double decisionIntelligence(int i_InteNO, int i_KnowNO)
{
     neuralWeightService();
     neuralIndexService(i_InteNO, i_KnowNO, Da_knowInput, Da_knowTarget);
     B_loadData=true;

     for(int i=0; i<=i_KnowNO-i_InteNO; i++)
     {
          neuralTraining.getPEOutput(da_PEOutput, Da_Output, Da_knowInput,...);
          neuralTraining. modifyOutputError(da_outputError, da_PEOutput, Da_knowTarget,...);
          for(int j=0; j<輸出層單元數; j++)
               d_sumError+=d_error*d_error;
          d_sumError+=neuralTraining.doBPNTraining(Da_knowInput, Da_knowTarget,...);
     }
     return d_sumError/(i_KnowNO-i_InteNO+1);
}
//-------------------------------------------------------------------------------------
public void getPEOutput(double[,]da_PEOutput, double[,]da_Output, double[,]da_knowInput,...)
{
     for(int l=1; l<ia_PENum.Length; l++)
     {
          for(int j=0;j<ia_PENum[l];j++)
          {
               for(int i=0;i<ia_PENum[l-1];i++)
                    da_PEOutput[l,j]+=da_PEOutput[l-1,i]*da_weight[l,i,j];
               da_PEOutput[l,j]=1/(1+Math.Exp(-(da_PEOutput[l,j])));
          }
     }
}
//-------------------------------------------------------------------------------------
public void modifyOutputError(double[,]da_outputError, double[,]da_PEOutput,...)
{
     for(int l=ia_PENum.Length-1; l>0; l--)
     {
          if(l==I_OUTPUT_LEVEL)
               for(int j=0;j<ia_PENum[l];j++)
                    da_outputError[l,j]=(da_knowTarget[i_InteNO,j]-da_PEOutput[l,j])*
                                        da_PEOutput[l,j]*(1-da_PEOutput[l,j]);
          else
               for(int i=0;i<ia_PENum[l];i++){
                    da_outputError[l,i]=0;
                    for(int j=0;j<ia_PENum[l+1];j++)
                         da_outputError[l,i]+=da_outputError[l+1,j]*da_weight[l+1,i,j]*
                                             da_PEOutput[l,j]*(1-da_PEOutput[l,j]);
               }
          for(int j=0;j<ia_PENum[l];j++){
               for(int i=0;i<ia_PENum[l-1];i++){
                    da_deltaWeight[l,i,j]=d_learnRate*da_outputError[l,j]*da_PEOutput[l-1,i]
                                          +d_moveFactor*da_deltaWeight[l,i,j];
                              da_weight[l,i,j]+=da_deltaWeight[l,i,j];
               }
          }
     }
}
//-------------------------------------------------------------------------------------
```

附錄A-6 企業知識與企業價值程式碼

```
//-------------------------------------------------------------------------------------
public void comKnowComs()
{
     int i_comNo=Ia_comNo.Length;
     int i_year=Ia_year.Length;
     getComInfo(da_ComInfo);

     for(int i=0; i<i_comNo; i++)
          for(int j=0; j<i_year; j++)
               for(int k=0; k<強化項目; k++)
                    sa_setData[j,k]=getTrans(getFinanceAnalysis(ComInfo,…)).ToString();

     getSetXML.xmlSave("檔案路徑", "表單名", 讀取筆數,...);
}

//-------------------------------------------------------------------------------------
public string getBusinessValue(int i_from, int i_to)
{
     int i_comNo=knowConsolidate.Ia_comNo.Length;
     string[,] sa_saveData = new string[I_ROW,I_COM];
     double[,,] da_comData = new double[I_COM,I_DAY, I_KNOW_ITEM];
     double[,,] da_comInfo = new double[I_COM,I_YEAR,I_KNOW_ITEM];
     double[,,] da_comKnow = new double[I_COM,I_YEAR,I_KNOW_ITEM];

     getComData(da_comData);
     knowConsolidate.getComInfo(da_comInfo);
     getComKnow(da_comKnow);
     getComValItem(sa_comNo, i_comNo);

     for(int i=0; i<i_to-i_from; j++)
     {
          getFinaStatYear();
          for(int j=0; j<i_comNo; j++)
          {
               modifyValueIndex(da_modComKnow, da_comKnow,...);
               sa_saveData[i_count,j]=getComValuation(da_modComKnow,...);
          }
     }
     getSetXML.xmlSave("檔案路徑", …, sa_saveData);
}
//-------------------------------------------------------------------------------------
```

附錄A-7 全域最佳化求解工具核心程式

```
//-------------------------------------------------------------------------------------
private void getGlobalOptimization()
{
     varInitial();
     String s_objFun=目標式;
     String []ST =限制式;

     for(int i=0; i<ST.Length; i++)
          getVarStart(ST[i]);

     for(int f=精確度階層; f>=0; f--)
     {
          double d_degree=Math.Pow(10,f)*d_varPoint;
          while(true)
          {
               for(int i=0; i<ST.Length; i++)
               if(!determineFunction(ST[i]))
                    b_detFun=false;

               if(b_detFun) {saveOptimal(getObjectValue(s_objFun));}
               if(adjustVariable(d_degree,1))
               {
                    adjustUpBottom(d_degree);
                    break;
               }
               b_detFun=true;
          }
     }
}
//-------------------------------------------------------------------------------------
```

附錄A-8 金融實驗模組核心程式

```
//-------------------------------------------------------------------------------------
private void doFinanceExperiment()
{
     double[,] da_TradeContainer = new double[容量,項目];
     neurTraiForm.getNeuralOutput( Da_Output, Da_Input);

     for(int i=i_from; i<=i_to; i++)
     {
          if(符合投資條件)
          {
               i_tradeSignal=多空訊號;
               d_investProfit+=setTradeContainer(da_medTradeContainer, i_tradeSignal,…);
               adjustInvest(d_investProfit);
          }
          else {i_tradeSignal=0;}

          graphicIndex(X軸座標, Y軸座標, i_tradeSignal);
          graphicProfit(X軸座標,Y軸座標);
          lbl_cycleRate.Text=資本週轉率;
          ……
          lbl_profitRate.Text=年獲益率;
     }
}
//-------------------------------------------------------------------------------------
```

附錄 B、檔案內容

附錄 B-1 大盤交易之歷史資料

```
<?xml version="1.0" encoding="big5" ?>
<Value>
    <Index>
        <識別碼>1</識別碼>
        <日期>780117</日期>
        <開盤價>5922.91</開盤價>
        <收盤價>6151.36</收盤價>
        <最高價>6151.36</最高價>
        <最低價>5857.4</最低價>
        <成交量>37961</成交量>
    </Index>
    <Index>
        <識別碼>2</識別碼>
        <日期>780118</日期>
        <開盤價>6151.36</開盤價>
        <收盤價>6086.67</收盤價>
        <最高價>6201.39</最高價>
        <最低價>6058.84</最低價>
        <成交量>35597</成交量>
    </Index>
    ……
</Value>
```

附錄 B-2 自動下載之網頁資料

```
<html>
<head><link rel='stylesheet' href='/ppp.css' type='text/css'></head><body>
<!_co_id_hhc=1101__>
<div align=left><FONT SIZE='3' COLOR='#000000' valign=top><B> L21 </B></FONT></div>
<table align=center><tr><td><FONT SIZE='4' COLOR='#006600'><B>
台泥</B></FONT></td><td><IMG SRC='/t05html/image/tit26.gif' BORDER=0 ALT=''></td></tr></table>
……
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<input type='hidden' name='SysName' value='財務報表'>
<input type='hidden' name='reportName' value='簡明損益表（三年）'>
<input type='hidden' name='Q1N' value='公司代號'>
<input type='hidden' name='Q1V' value='1101'>
<input type='hidden' name='Q2N' value='資料年度'>
<input type='hidden' name='Q2V' value='88'>
……
<TR><TD><FONT SIZE='2' COLOR='#000099'>營業收入淨額</FONT></TD>
<TD align=right><FONT SIZE=3> 
            15,708,885
……
</body>
</html>
```

附錄 B-3 知識萃取之企業實體(範例為 1101 公司 88 年度之擷取片段)

```
<?xml version="1.0" ?>
<Ontology>
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      <Company>
            <年度>88</年度>
            <負債佔資產比率>49.87</負債佔資產比率>
            <長期資金佔固定資產比率>164.83</長期資金佔固定資產比率>
            <流動比率>129.98</流動比率>
            <速動比率>101.31</速動比率>
            <利息保障倍數>3.46</利息保障倍數>
            <應收款項週轉率>6.20</應收款項週轉率>
            <應收款項收現日數>58.87</應收款項收現日數>
            <存貨週轉率>14.31</存貨週轉率>
            <平均售貨日數>25.50</平均售貨日數>
            <固定資產週轉率>0.41</固定資產週轉率>
            <總資產週轉率>0.24</總資產週轉率>
            <資產報酬率>4.95</資產報酬率>
            <股東權益報酬率>6.65</股東權益報酬率>
            <營業利益佔實收資本比率>3.16</營業利益佔實收資本比率>
            <稅前純益佔實收資本比率>10.74</稅前純益佔實收資本比率>
            <純益率>14.36</純益率>
            <每股盈餘>1.20</每股盈餘>
            <現金流量比率>26.84</現金流量比率>
            <現金流量允當比率>34.85</現金流量允當比率>
            <現金再投資比率>1.38</現金再投資比率>
            <營業收入淨額>17,200.76</營業收入淨額>
            <營業利益>692.65</營業利益>
            <營業外收支淨額>1,664.61</營業外收支淨額>
            <稅後純益>2,469.79</稅後純益>
            <本期末股本>21,965.00</本期末股本>
            <每股淨值>18.28</每股淨值>
            <流動資產>7,614,440</流動資產>
            <固定資產>44,667,683</固定資產>
            <無形資產>967,132</無形資產>
            <其他資產>3,397,122</其他資產>
            <流動負債>5,858,125</流動負債>
            <長期附息負債>24,410,607</長期附息負債>
            <其他負債>9,719,251</其他負債>
            <股本>21,965,000</股本>
            <資本公積>12,507,556</資本公積>
            <保留盈餘>6,107,768</保留盈餘>
            <其它項目>-412,131</其它項目>
            <資產總計>80,156,176</資產總計>
            <負債總計>39,987,983</負債總計>
            <股東權益>40,168,193</股東權益>
            <營業成本>15,565,753</營業成本>
            <營業毛利>1,635,011</營業毛利>
            <調整項目>-29,509</調整項目>
            <營業費用>912,846</營業費用>
            <稅前純益>2,357,275</稅前純益>
            <所得稅費用>-112,522</所得稅費用>
            ……
      </Company>
    ……
<Ontology>
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附錄 B-4 資訊化之 MA 技術指標

```
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      ……
      <MA>
            <Num>321</Num>
            <MA_5>11450.08</MA_5>
            <MA_20>11839.2595</MA_20>
            <MA_60>10709.0748333333</MA_60>
            <MA_125>10357.75328</MA_125>
            <MA_250>9771.4108</MA_250>
      </MA>
      ……
      <MA>
            <Num>666</Num>
            <MA_5>6008.326</MA_5>
            <MA_20>6016.07</MA_20>
            <MA_60>5485.264</MA_60>
            <MA_125>4858.0332</MA_125>
            <MA_250>4393.36704</MA_250>
      </MA>
      ……
</Index>
```

附錄 B-5 知識化之 MA 買賣訊號研判

```
<?xml version="1.0" ?>
<Index>
    ……
    <MA>
      <Num>歷史資料編號</Num>
      <MA1>突破之買進訊號--平均線由下跌逐漸走平，且股價由平均線下方突破平均線</MA1>
      <MA2>上整之買進訊號--股價跌入平均線下，但平均線仍上揚，且股價又回到平均線之上</MA2>
      <MA3>強勢之買進訊號--股價線在平均線之上，股價突然下跌，但未跌破均線，股價又上升</MA3>
      <MA4>超跌之買進訊號--股價線在平均線之下，突然暴跌更加遠離平均線時</MA4>
      <MA5>黃金交叉之買進訊號--當短期移動平均線由下往上穿越長期平均線時，為買進訊號</MA5>
      <MA6>跌破之賣出訊號--平均線由上升逐漸走平，且股價由平均線上方跌破平均線</MA6>
      <MA7>下整之賣出訊號--股價升至平均線之上，但又回到平均線之下，且仍繼續下跌</MA7>
      <MA8>弱勢之賣出訊號--股價線在平均線之下，股價突然上升，但未升達均線股價又下降</MA8>
      <MA9>超漲之賣出訊號--股價線在平均線之上，突然暴漲更加遠離平均線時</MA9>
      <MA10>死亡交叉之賣出訊號--當短期移動均線由上方往下穿過長期均線時，為賣出訊號</MA10>
    </MA>
    ……
    <MA>
      <Num>399</Num>
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      <MA2>0</MA2>
      <MA3>0</MA3>
      <MA4>0</MA4>
      <MA5>0</MA5>
      <MA6>1</MA6>
      <MA7>0</MA7>
      <MA8>0</MA8>
      <MA9>0</MA9>
      <MA10>0</MA10>
    </MA>
    ……
</Index>
```

附錄 B-6 知識強化檔案的內容

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<Ontology>
    …
        <長期資金佔固定資產比率>.8373</長期資金佔固定資產比率>
        <流動比率>.78411</流動比率>
        <速動比率>.73167</速動比率>
        <利息保障倍數>.50615</利息保障倍數>
        <應收款項週轉率>.99797</應收款項週轉率>
        <存貨週轉率>1</存貨週轉率>
        <固定資產週轉率>.60109</固定資產週轉率>
        <總資產週轉率>.55971</總資產週轉率>
        <資產報酬率>.51237</資產報酬率>
        <股東權益報酬率>.51662</股東權益報酬率>
        <營業利益佔實收資本比率>.5079</營業利益佔實收資本比率>
        <稅前純益佔實收資本比率>.52682</稅前純益佔實收資本比率>
        <純益率>.53584</純益率>
        <每股盈餘>.76852</每股盈餘>
        <現金流量比率>.5667</現金流量比率>
        <現金再投資比率>.50345</現金再投資比率>
        <本益比>.83333</本益比>
        <股價銷售比>1.27698</股價銷售比>
        <股價淨值比>.0547</股價淨值比>
        <價值指標率>.03282</價值指標率>
    </Company>
</Ontology>
```

附錄 B-7 企業評價分數檔案之內容

```
<?xml version="1.0" ?>
<Valuation>
    ……
    <Company>
        <評價日期>89/01/04</評價日期>
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        <V_1102>5.60366</V_1102>
        <V_1103>5.89042</V_1103>
        <V_1104>8.85632</V_1104>
        <V_1107>7.17857</V_1107>
        <V_1108>7.43264</V_1108>
        <V_1109>7.19507</V_1109>
        <V_1110>7.27247</V_1110>
        <V_1201 />
        <V_1204>6.09149</V_1204>
        <V_1207>4.79616</V_1207>
        <V_1210>14.5863</V_1210>
        <V_1212>10.25345</V_1212>
        <V_1213>7.71431</V_1213>
        <V_1215>16.50729</V_1215>
        <V_1216>10.71189</V_1216>
        <V_1217>13.33758</V_1217>
        <V_1218>14.54338</V_1218>
    ……
    </Company>
</Valuation>
```

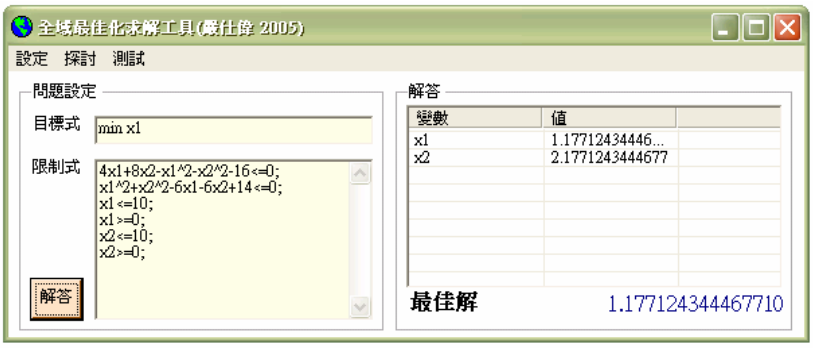
附錄 C-1 全域最佳化求解工具求解範例

範例一：

$$
\begin{aligned}
&min \quad x_1 + x_2 \\
&s.t. \\
&\quad x_1^2 + x_2^2 - 4x_1^{1.5} + 4x_2^{0.5} + 10 \le 0 \\
&\quad x_1^2 + x_2^2 - 6x_1 - 6x_2 + 14 \le 0 \\
&\quad 0 \le x_1 \le 10 \\
&\quad 0 \le x_2 \le 10
\end{aligned}
$$

範例二：

$$
\begin{aligned}
&\min \quad x_1 \\
&\text{s.t.} \quad \frac{1}{4}x_1 + \frac{1}{2}x_2 - \frac{1}{16}x_1^2 - \frac{1}{16}x_2^2 - 1 \le 0 \\
&\quad \frac{1}{14}x_1^2 + \frac{1}{14}x_2^2 + 1 - \frac{3}{7}x_1 - \frac{3}{7}x_2 \le 0 \\
&\quad 0 \le x_1 \le 10 \\
&\quad 0 \le x_2 \le 10
\end{aligned}
$$



範例三：

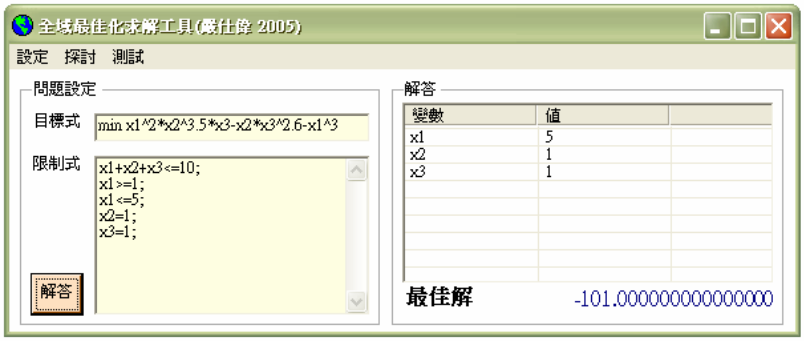
$$min \quad x_1^2 x_2^{3.5} x_3 - x_2 x_3^{2.6} - x_1^3$$

s.t.

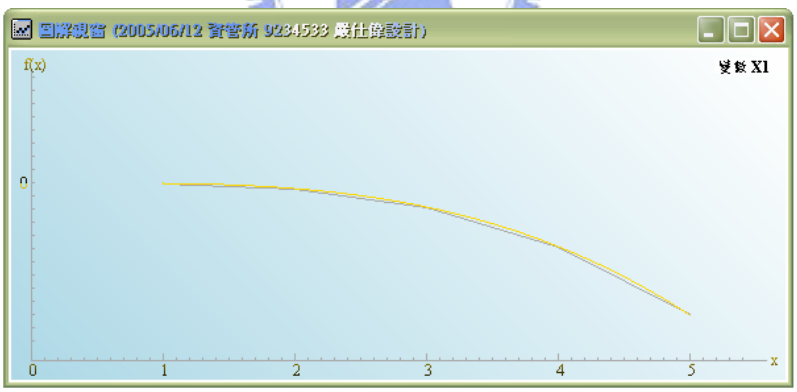
$$x_1 + x_2 + x_3 \le 10$$

$$1 \le x_1 \le 5, \quad 1 \le x_2 \le 5, \quad 1 \le x_3 \le 5$$

將變數 X2 及變數 X3 設定為 1，觀察變數 X1 對目標函式的影響變化，首先由全域最佳求解工具中獲得當變數 X1 為 5 時有最佳解-101。



接著點選【探討/圖解】功能見，系統將呈現變數 X1 的變化，圖中黃線為非整數求解函式，黑線為整數求解模式。

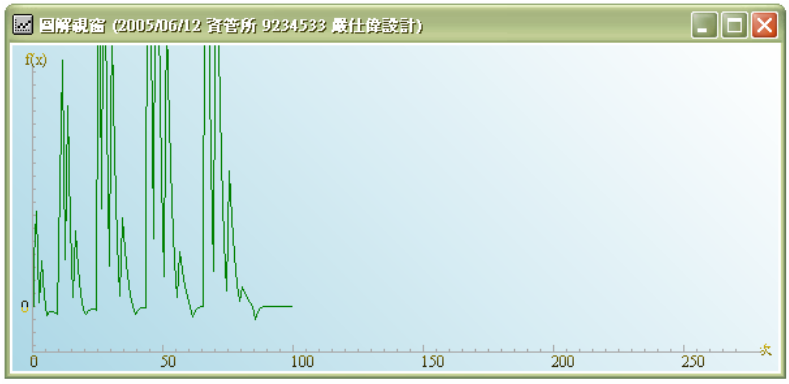


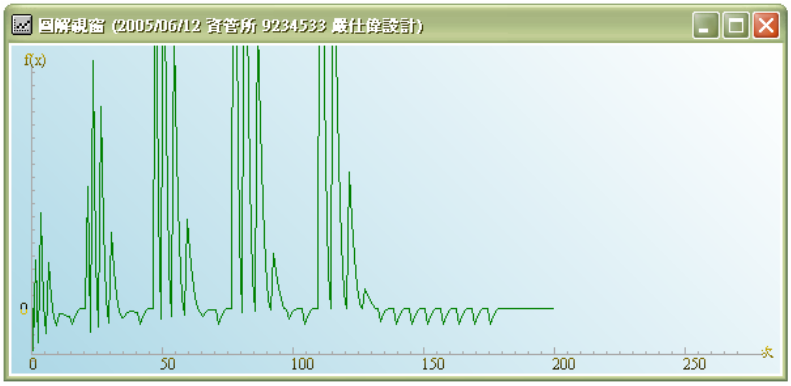
其次可再探討當變數 X1 與變數 X3 固定為 1 時，X2 對目標函式的影響：獲得當 X2 趨近於 1 時具有最佳解，當 X2 愈大時目標解也愈大。

最後觀察 X3 對目標解的影響，當 X3 為 5 時具有最佳解-61.66，變數 X3 隨著值的增加而使目標值更小。

接著直接以全域最佳化求解工具求算最佳解，獲得最佳化的解答為-101，變數 X1、X2、X3 的值分別為 5、1、1。

以圖解視窗觀看系統搜尋求解的過程，總計搜尋約 88 次，最佳的目標值的於最後階段獲得。



將題目作一些改變，將變數 X1、X2、X3 的下界線均設定為 0，再次以全域最佳化求解工具求解，獲得最佳解為-328.316，X1、X2、X3 分別為 0、5、5。

從圖解視窗可發現，系統的最佳解於搜尋最前段發生，共計搜尋次數為 180 次。