

COMPONENTS DEMOS

DSP Programming – Demonstration Program 5

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' DemoFilterSpect - Demonstrate filtering and spectrum calculation
',
' You may need to add the ZedGraph component to the toolbox:
' - Tools | Choose Toolbox Items
' - .NET Framework Components, browse to ZedGraph.dll and select
',
' Create a form with a menu strip for the Play command, and
' add Input and Output sub-menu options, then add a
' ZedGraph control then set its dock property to fill the form.
',
' Use the "My Project" dialog to configure the program:
' - under the Compile tab, press "Advanced Compilation Options"
'   and change the Target CPU to "x86"
' - under the References tab, click the "Add" button then browse for
'   and select the BasicDSP.dll and ZedGraph.dll libraries.
',
Imports BasicDSP
Public Class DemoFiltSpect
    ' size of signals
    Const SAMPRATE As Integer = 20000
    Const NUMSAMP As Integer = 20000
    ' input and output signals
    Dim isig As Signal = New Signal(NUMSAMP, SAMPRATE)
    Dim osig As Signal = New Signal(NUMSAMP, SAMPRATE)
    ' graphics object
    Dim gp As Graph

    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        ' create a graph object
        gp = New Graph(Me.CreateGraphics, ZedGraphControll1, 3, 1,
"Filtering")
        ' initialise input to some white noise
        For i As Integer = isig.First To isig.Last
            isig(i) = Sample.Noise(5000)
        Next
        ' build a filter
        Dim bpass As LTISystemChain = Filter.ButterworthBandPass(0.1, 0.2,
8)
        ' filter the signal
        For i As Integer = osig.First To osig.Last
            osig(i) = bpass(isig(i))
        Next
        ' calculate the input spectrum (from first 1024 samples converted
to Complex)
        Dim ispect As Spectrum = DFT.ComplexFFT(isig.Cut(1,
1024).Float.Complex)
        gp.PlotDbSpectrum(1, ispect.Half, "Input")
        ' calculate the filter frequency response
        Dim fspect As New Spectrum(500, SAMPRATE / 2)
        For i As Integer = 0 To 499
            fspect(i) = bpass.response(i / 1000)
        Next
        gp.PlotDbSpectrum(2, fspect, "Filter")
    End Sub
End Class
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    ' calculate the output spectrum
    Dim ospect As Spectrum = DFT.ComplexFFT(osig.Cut(1,
1024).Float.Complex)
    gp.PlotDbSpectrum(3, ospect.Half, "Output")
End Sub
' replay original
Private Sub InputToolStripMenuItem_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs)
    isig.Replay()
End Sub
' replay filtered output
Private Sub OutputToolStripMenuItem_Click(ByVal sender As
System.Object, ByVal e As System.EventArgs)
    osig.Replay()
End Sub
End Class

```

