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' PET hop sequence cross correlator
' Checks the cross correlation between sequences

' Pinnacle technologies
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' 03-02-2000
' Version 1.1
ver$ = "1.1"

DIM table%(255, 49), corr%(255), results%(255)

CLS
PRINT "Random file name must be: hoptable.txt"
PRINT "Current file name must be: chlist.txt"
PRINT
PRINT "Input File Type (Random or Current) (r or c) _ ";
type$ = ""
DO
    type$ = LCASE$(INKEY$)
    IF type$ <> "r" AND type$ <> "c" AND type$ <> "" THEN
        SOUND 700, 2
        type$ = ""
    END IF
LOOP WHILE type$ = ""

PRINT type$

'handle Pinnacle and Infinetix file types
IF type$ = "r" THEN
    'Pinnacle file
    OPEN "hoptable.txt" FOR INPUT AS #1

    'get rid of the Pinnacle header
    FOR nn% = 1 TO 3
        LINE INPUT #1, i$
    NEXT nn%
ELSE
    'Infinetix file
    OPEN "chlist.txt" FOR INPUT AS #1
END IF

'read in the data to the table, and generate
'a second copy of each sequence such that there
'are two copies of the sequence lined up head to
'tail.
FOR seq% = 0 TO 255
    LINE INPUT #1, ii$
IF seq% = 0 THEN ix$ = ii$
    'get rid of the line header
    IF type$ = "r" THEN
        'Pinnacle line header
        position% = INSTR(1, ii$, ":")
    ELSE
        'Infinetix line header
        position% = INSTR(1, ii$, ",")
    END IF

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ii$ = MID$(ii$, position% + 1)

'ii$ now contains the data. It is the same
'for either Pinnacle or Infinetix.

'Put the data into the table
FOR hop% = 0 TO 24
    'strip off a character
    IF hop% <> 24 THEN
        pointer% = INSTR(1, ii$, ",")
        hopval% = VAL(MID$(ii$, 1, pointer% - 1))

        'remove the data just obtained from the
        'string
        ii$ = MID$(ii$, pointer% + 1)
    ELSE
        hopval% = VAL(ii$)
    END IF

    table%(seq%, hop%) = hopval%
    table%(seq%, hop% + 25) = hopval%
NEXT hop%
NEXT seq%

'Data is in the table, so close the input file
CLOSE #1
'=====
'do the correlation
PRINT
PRINT "Press any key to terminate"

'Initialize the maximum correlation value
'to the best case value
totalcorrmax% = 0

'Initialize the minimum correlation value
'to the worst case value
totalcorrmin% = 25

'Initialize the mean correlation value
'to the best case value
totalcorrmean% = 0

'the sequence being tested against all the
'other sequences
FOR testseq% = 0 TO 255

    'Allow an exit method
    IF INKEY$ <> "" THEN END

    'The maximum value of the correlation that
    'this test sequence has against any of the
    'other sequences, except itself, which is
    'always 25
    maxcorr% = 0

    LOCATE 8, 5

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PRINT SPACE$(50)
LOCATE 8, 5
PRINT "Working on Test Sequence # "; LTRIM$(RTRIM$(STR$(testseq%)))

'The sequence it is being tested against
FOR seq% = 0 TO 255

    'don't test the test sequence against itself
    'since this will always yield 25
    IF seq% <> testseq% THEN

        FOR lag% = 0 TO 24
            corr% = 0
            'Does the correlation for a given lag%
            FOR nn% = 0 TO 24
                IF table%(testseq%, nn%) = table%(seq%, nn% + lag%) THEN
                    corr% = corr% + 1
                END IF
            NEXT nn%

            'see if this lag had a larger correlation than
            'the previous lag. If so, save the large value
            IF corr% > maxcorr% THEN
                maxcorr% = corr%
            END IF
        NEXT lag%
    END IF
NEXT seq%

results%(testseq%) = maxcorr%

'Find the maximum correlation for all
'the different sequences
IF maxcorr% > totalcorrmax% THEN
    totalcorrmax% = maxcorr%
END IF

'Find the minimum correlation for all
'the different sequences
IF maxcorr% < totalcorrmin% THEN
    totalcorrmin% = maxcorr%
END IF

'Compute the mean correlation for all
'the different sequences
totalcorrmean% = totalcorrmean% + maxcorr%

NEXT testseq%

'All done with the correlation, now print the results
totalcorrmean = INT(totalcorrmean% / 256 * 100) / 100
PRINT
PRINT "The Maximum Correlation was "; totalcorrmax%
PRINT "The Minimum Correlation was "; totalcorrmin%
PRINT "The Mean Correlation was "; totalcorrmean
PRINT

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OPEN "hop_corr.txt" FOR OUTPUT AS #1
PRINT
PRINT "Printing results to the file HOP_CORR.TXT"

PRINT #1, "Sequence types = ";
IF type$ = "r" THEN
    PRINT #1, "Random"
ELSE
    PRINT #1, "Current"
END IF

PRINT #1,
PRINT #1, "The Maximum Correlation was "; totalcorrmax%
PRINT #1, "The Minimum Correlation was "; totalcorrmin%
PRINT #1, "The Mean      Correlation was "; totalcorrmean

PRINT #1,

FOR seq% = 0 TO 255
    PRINT #1, seq%, results%(seq%)
NEXT seq%

CLOSE 1
PRINT
PRINT "All Done"

END
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