dtSearch Desktop/Network
Indexing and Search techniques

T206 – SEARCHING FOR NUMERIC PATTERNS

dtSearch Desktop/Network is a powerful search tool used by professionals for a wide variety of tasks. This article aims to show you how to search for numeric patterns such as IPv4 or IPv6 addresses using wildcards or regular expressions in a one-time search or to find all such patterns in a collection of files.

Course Prerequisites
dtSearch Desktop/Network 7.68 or later

User Thesaurus Plus 1.2
(Optional – Includes IPv4, IPv6 & Bitcoin macros)

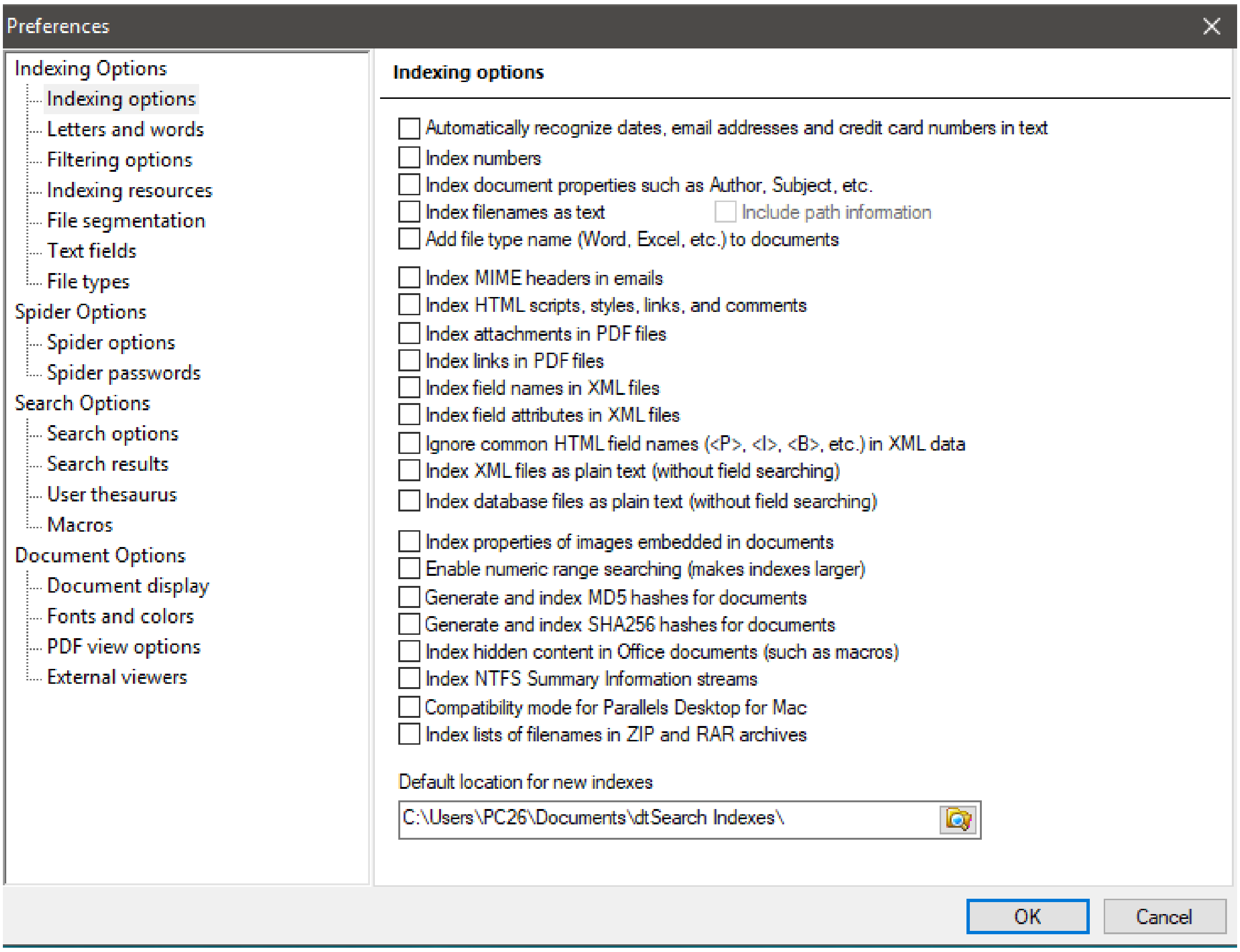
T206 – SEARCHING FOR NUMERIC PATTERNS

This training session covers advanced topics of interest to those that need to find documents containing numeric patterns such as IP addresses (IPv4 or IPv6). After completion you should be able to make searches to find a number or all instances of a numeric pattern using a macro

Before beginning the training session, all copies of dtSearch Desktop must have the same initial indexing and display setup. Access to the **T206** test documents is also required. This can be carried out by each trainee as part of the session or by an instructor before the session starts (See **Appendix**).

Initial setup of dtSearch Desktop:

From the **Options** menu, choose **Preferences > Indexing Options**



Indexing options

□ Automatically recognize dates, email addresses and credit card numbers in text
□ Index numbers
□ Index document properties such as Author, Subject, etc.
□ Index filenames as text □ Include path information
□ Add file type name (Word, Excel, etc.) to documents

□ Index MIME headers in emails
□ Index HTML scripts, styles, links, and comments
□ Index attachments in PDF files
□ Index links in PDF files
□ Index field names in XML files
□ Index field attributes in XML files
□ Ignore common HTML field names (<P>, <I>, <B>, etc.) in XML data
□ Index XML files as plain text (without field searching)
□ Index database files as plain text (without field searching)

□ Index properties of images embedded in documents
□ Enable numeric range searching (makes indexes larger)
□ Generate and index MD5 hashes for documents
□ Generate and index SHA256 hashes for documents
□ Index hidden content in Office documents (such as macros)
□ Index NTFS Summary Information streams
□ Compatibility mode for Parallels Desktop for Mac
□ Index lists of filenames in ZIP and RAR archives

Default location for new indexes

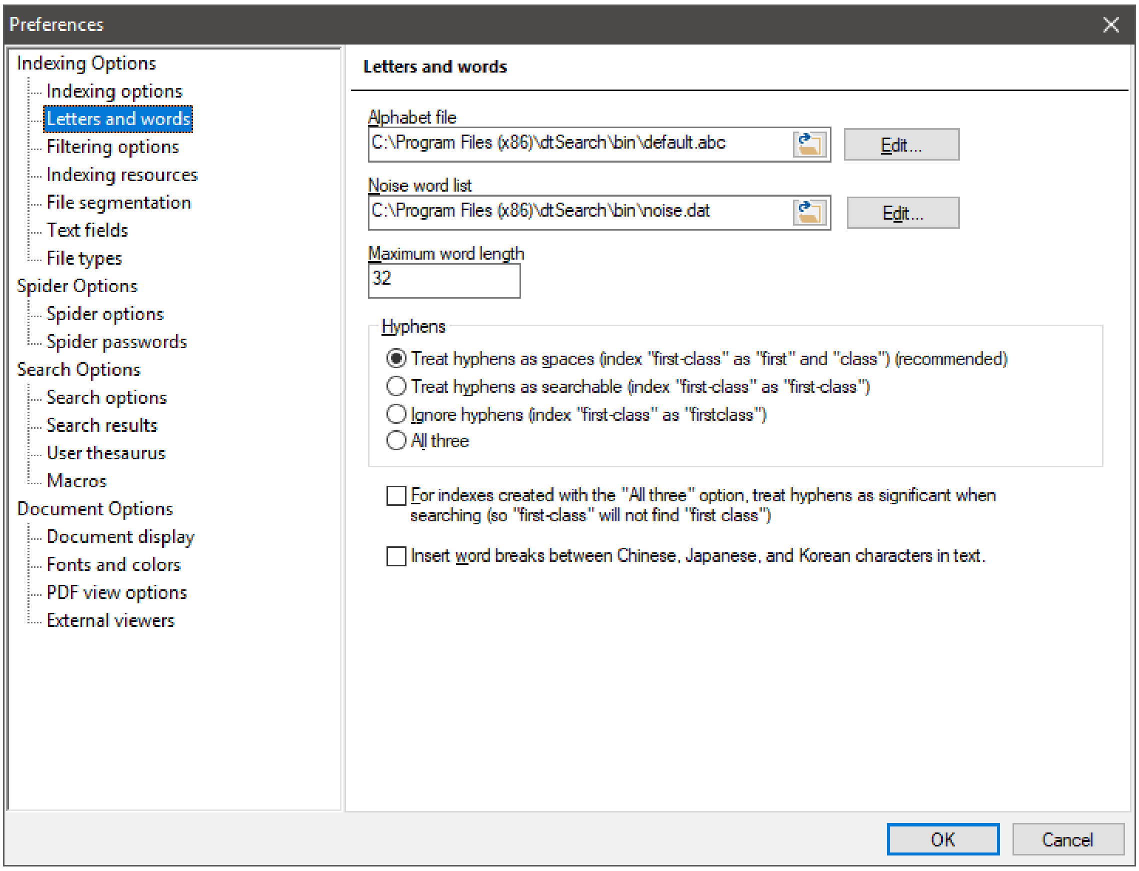
C:\Users\PC26\Documents\dtSearch Indexes\

Make sure that all checkboxes are **not** selected.

TIP: *To use the keyboard instead of a mouse to navigate, use* ***Ctrl+Tab*** *or* ***Ctrl+Shift+Tab*** *to move down or back up in the left-hand panel. Use* ***Tab*** *or* ***Shift+Tab*** *to move down or up in the right-hand panel.*

Next choose **Letters and words**

Click on the **Alphabet file Edit…** button.



Letters and words

Alphabet file: C:\Program Files (x86)\dtSearch\bin\default.abc

Noise word list: C:\Program Files (x86)\dtSearch\bin\noise.dat

Maximum word length: 32

Hyphens

● Treat hyphens as spaces (index "first-class" as "first" and "class") (recommended)

○ Treat hyphens as searchable (index "first-class" as "first-class")

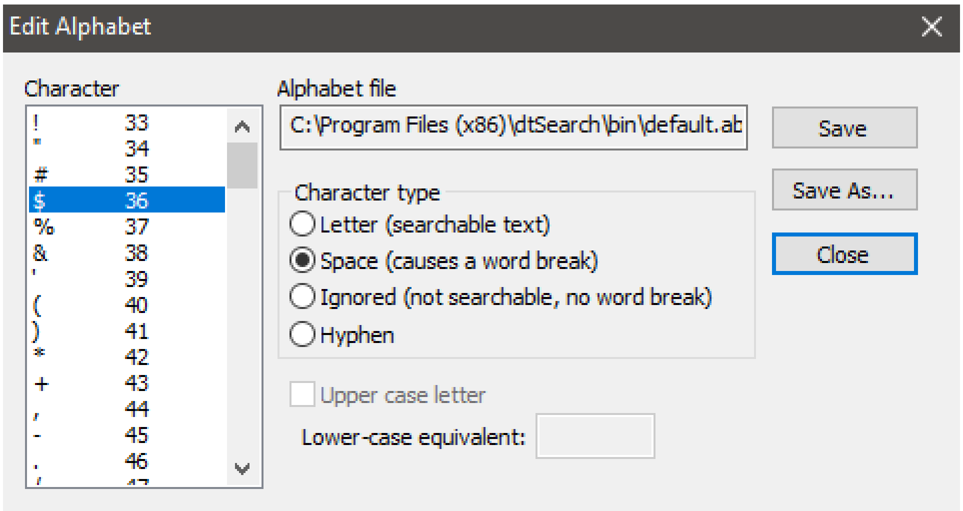
○ Ignore hyphens (index "first-class" as "firstclass")

○ All three

□ For indexes created with the "All three" option, treat hyphens as significant when searching (so "first-class" will not find "first class")

□ Insert word breaks between Chinese, Japanese, and Korean characters in text.

Make sure that all characters from 33 to 36 are set to **Space**. 37 to **Ignored,** 38 to 44 to **Space**, 45 to **Hyphen**, 46 and 47 to **Space**. If you make any changes press **Save** before closing the dialog.



Character

!	33
"	34
#	35
$	36
%	37
&	38
'	39
(	40
)	41
*	42
+	43
,	44
-	45
.	46
/	47

Alphabet file: C:\Program Files (x86)\dtSearch\bin\default.ab

Character type

○ Letter (searchable text)

● Space (causes a word break)

○ Ignored (not searchable, no word break)

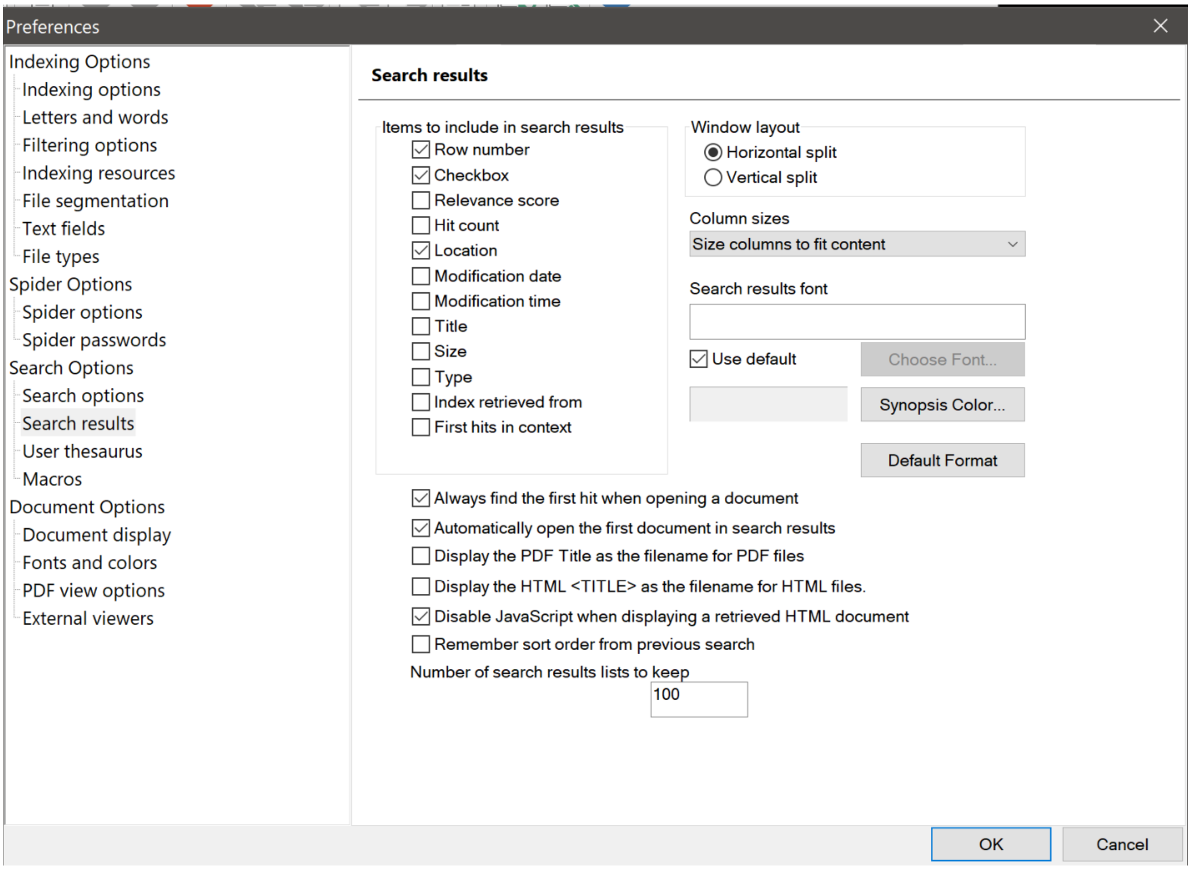
○ Hyphen

□ Upper case letter

Lower-case equivalent:

Click the **Edit…** button alongside the **Noise word list** textbox. For this session we need an empty noise word list. Create one by deleting all the words in the list, then press the **Save As...** button and save it with a file name of *none.dat*. Now **Close** the dialog.

Finally set the **Search results** layout to the settings shown below:



Search results

Items to include in search results
- ☑ Row number
- ☑ Checkbox
- □ Relevance score
- □ Hit count
- ☑ Location
- □ Modification date
- □ Modification time
- □ Title
- □ Size
- □ Type
- □ Index retrieved from
- □ First hits in context

Window layout
- ● Horizontal split
- ○ Vertical split

Column sizes: Size columns to fit content

Search results font

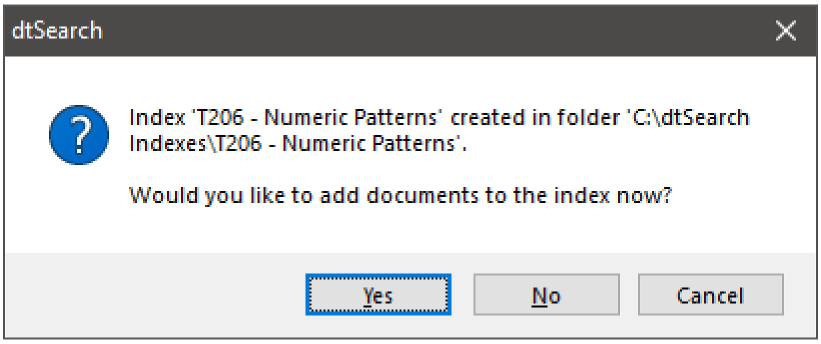
☑ Use default

- ☑ Always find the first hit when opening a document
- ☑ Automatically open the first document in search results
- □ Display the PDF Title as the filename for PDF files
- □ Display the HTML <TITLE> as the filename for HTML files.
- ☑ Disable JavaScript when displaying a retrieved HTML document
- □ Remember sort order from previous search

Number of search results lists to keep: 100

Now we are ready to create an Index. From the **Index** menu select **Create index...** Enter the name of the index as `T206 – Numeric Patterns` and click **OK**.

Click **Yes** to add documents to your new index.



Index 'T206 - Numeric Patterns' created in folder 'C:\dtSearch Indexes\T206 - Numeric Patterns'.

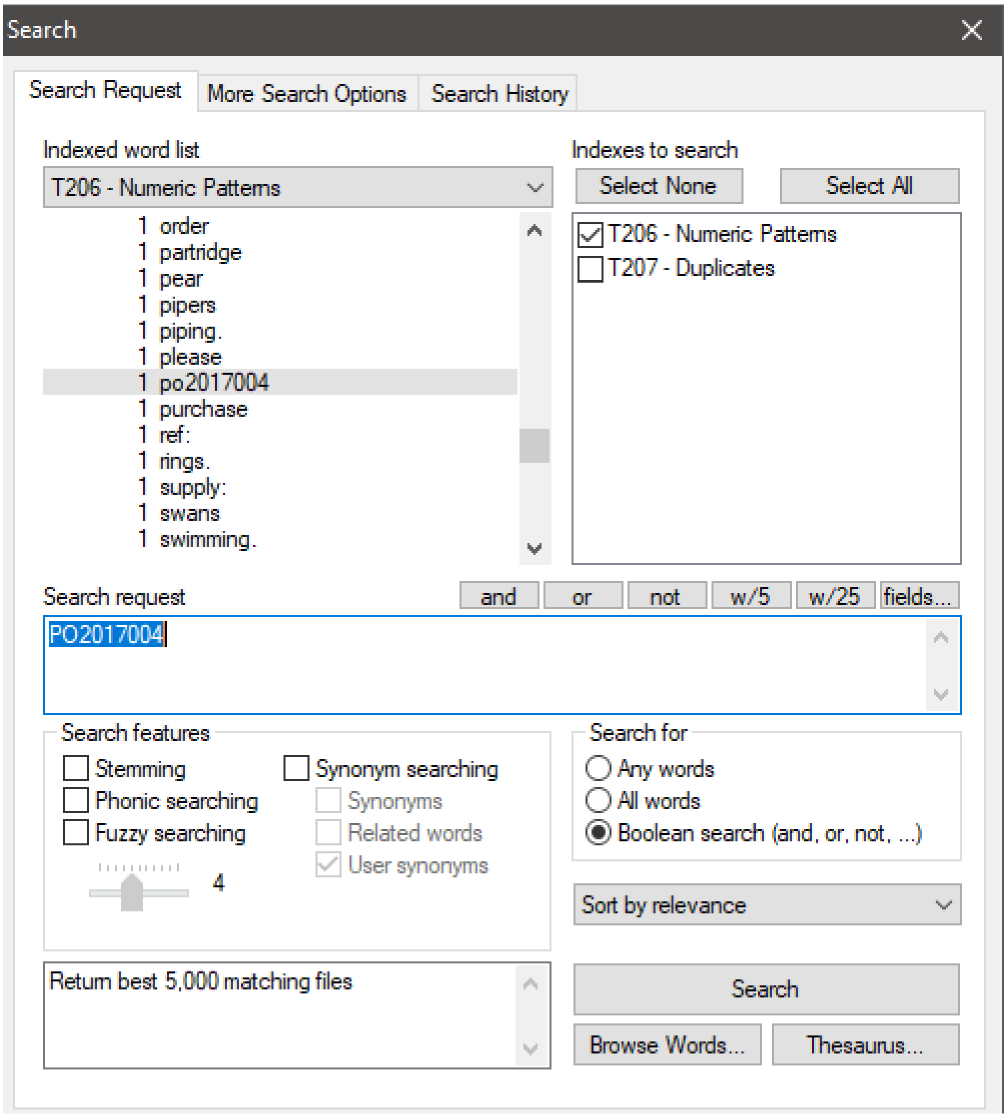
Would you like to add documents to the index now?

In the **Update Index** dialog that appears, press the **Add Folder...** button and browse to the **T206** test document folder (see **Appendix**).

The **Update Index** dialog will now re-appear. Click the **Start Indexing** button. When indexing is complete (less than 1 second) press the **Close** button.

We are now ready to start searching!

For a single keyword search, open the Search dialog. Press the **Select None** button to unselect any previously selected indexes then select the T206 index. Make sure no **Search features** are enabled and that Boolean search is selected.



Indexed word list: T206 - Numeric Patterns

1 order
1 partridge
1 pear
1 pipers
1 piping.
1 please
1 po2017004
1 purchase
1 ref:
1 rings.
1 supply:
1 swans
1 swimming.

Indexes to search

☑ T206 - Numeric Patterns
☐ T207 - Duplicates

Search request: PO2017004

Search features

☐ Stemming
☐ Phonic searching
☐ Fuzzy searching 4
☐ Synonym searching
☐ Synonyms
☐ Related words
☑ User synonyms

Search for

○ Any words
○ All words
● Boolean search (and, or, not, ...)

Sort by relevance

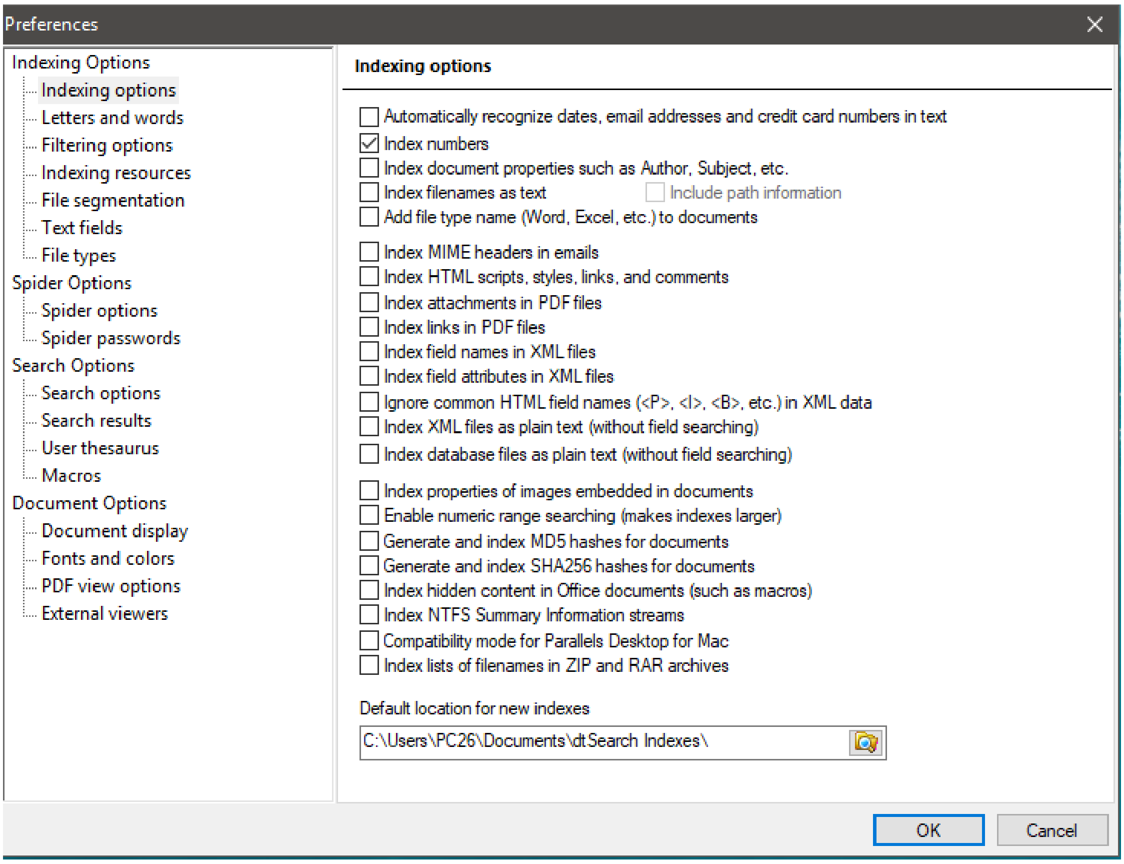
Return best 5,000 matching files

Search for **PO2017004** and the Example Purchase Order.txt should be retrieved. Now search for the telephone number **0208-590-8888**. You should get a 'no files retrieved' message, even though we know **0208-590-8888** exists in Example Purchase Order.txt.

dtSearch does not index currency signs or numbers by default. This is to make indexes smaller and reduce indexing time, however, a ‘number’ is any ‘word’ beginning with a digit. Because of this behaviour, **PO20170004** and similar strings that begin with a letter will be found, even though they contain mostly digits.

To find a term beginning with a digit, we need to edit the indexing options.

Select **Options > Preferences > Indexing options**, check the **Index numbers** checkbox and click **OK**



Indexing options

☐ Automatically recognize dates, email addresses and credit card numbers in text
☑ Index numbers
☐ Index document properties such as Author, Subject, etc.
☐ Index filenames as text ☐ Include path information
☐ Add file type name (Word, Excel, etc.) to documents

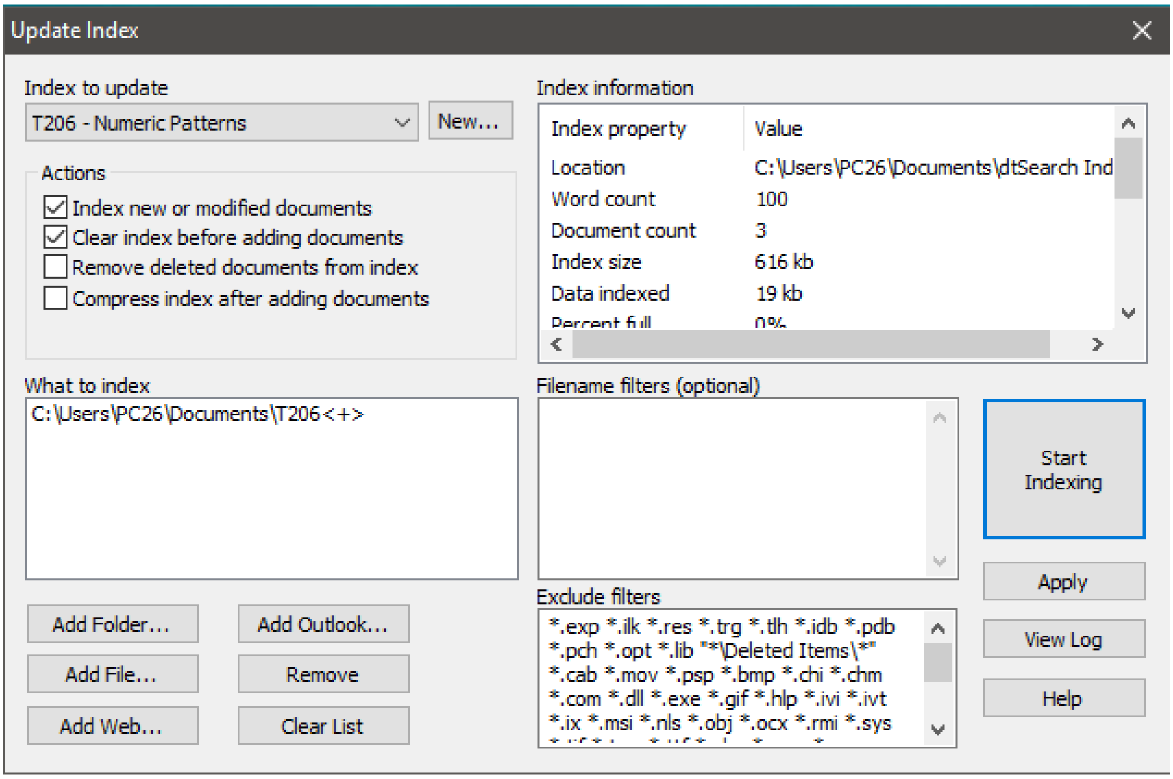
☐ Index MIME headers in emails
☐ Index HTML scripts, styles, links, and comments
☐ Index attachments in PDF files
☐ Index links in PDF files
☐ Index field names in XML files
☐ Index field attributes in XML files
☐ Ignore common HTML field names (<P>, <I>, <B>, etc.) in XML data
☐ Index XML files as plain text (without field searching)
☐ Index database files as plain text (without field searching)

☐ Index properties of images embedded in documents
☐ Enable numeric range searching (makes indexes larger)
☐ Generate and index MD5 hashes for documents
☐ Generate and index SHA256 hashes for documents
☐ Index hidden content in Office documents (such as macros)
☐ Index NTFS Summary Information streams
☐ Compatibility mode for Parallels Desktop for Mac
☐ Index lists of filenames in ZIP and RAR archives

Default location for new indexes
C:\Users\PC26\Documents\dtSearch Indexes\

This option will not affect an index that has already been built.

To see the benefit of this option, rebuild the index by selecting **Index > Update Index…** and enable the two indexing Actions as shown below.



Index to update
T206 - Numeric Patterns

Actions
☑ Index new or modified documents
☑ Clear index before adding documents
☐ Remove deleted documents from index
☐ Compress index after adding documents

Index information

Index property	Value
Location	C:\Users\PC26\Documents\dtSearch Ind
Word count	100
Document count	3
Index size	616 kb
Data indexed	19 kb
Percent full	0%

What to index
C:\Users\PC26\Documents\T206<+>

Filename filters (optional)

Exclude filters
*.exp *.ilk *.res *.trg *.tlh *.idb *.pdb
*.pch *.opt *.lib "*\Deleted Items*"
*.cab *.mov *.psp *.bmp *.chi *.chm
*.com *.dll *.exe *.gif *.hlp *.ivi *.ivt
*.ix *.msi *.nls *.obj *.ocx *.rmi *.sys

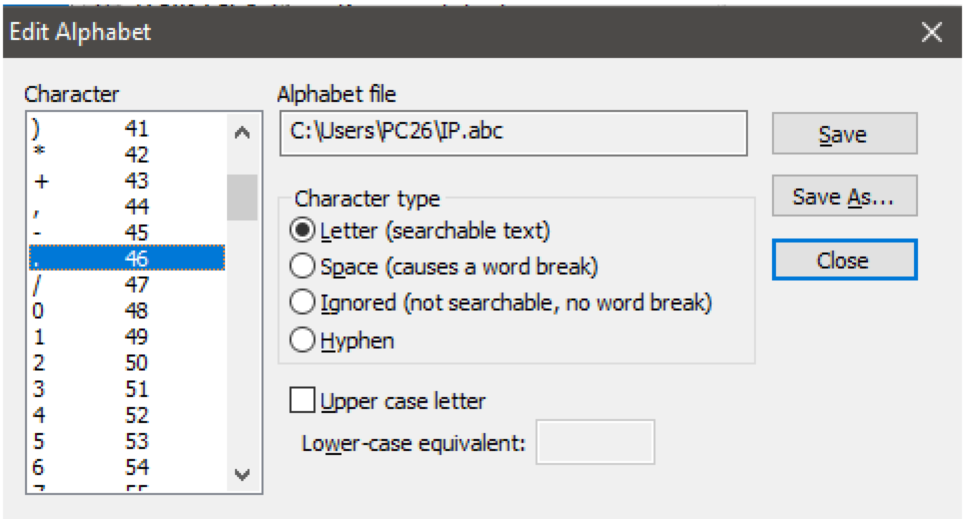
Search for **0208-590-8888** again. Example Purchase Order.txt should now be returned. Although this is a simple example, it highlights the importance of choosing relevant indexing options.

Most search software use **?** and ***** as wildcards to represent a single character and multiple characters respectively. dtSearch has an additional single digit wildcard **=** that is useful for increasing the precision of your searches. **PO20170004** can be returned with a search query of **PO2017====** or **PO========** instead of the less precise **PO*** or **PO????????** which could return **POPULATION**.

Another default behaviour of dtSearch is to treat commas and full stops (period) as a space so that words with trailing punctuation are indexed correctly, this has the undesired side-effect of causing an IPv4 address such as **198.51.100.255** to be indexed as four separate numbers.

To modify this behaviour, select **Options > Preferences > Letters and words** and click **Edit…** next to the Alphabet file textbox.

Find character 46 and select **Letter** as shown. This modified alphabet file will severely affect standard searching and should only be used for specialised numeric searches.
Use **Save As…** and save this modified file as IP.abc. Now press **Close**.



Character

)	41
*	42
+	43
,	44
-	45
.	46
/	47
0	48
1	49
2	50
3	51
4	52
5	53
6	54

Alphabet file: C:\Users\PC26\IP.abc

Character type
● Letter (searchable text)
○ Space (causes a word break)
○ Ignored (not searchable, no word break)
○ Hyphen

□ Upper case letter

Lower-case equivalent:

Rebuild the index by Selecting **Index > Update Index…** and enable the two indexing Actions as before. You will now be able to search for **198.51.100.255** as one term, which should return IPv4.txt.

Searching for an IPv6 address such as **2001:0db8:85a3:0000:0000:8a2e:0370:7334**, requires further changes. Edit the IP.abc alphabet file to make character 58 a letter and **Save** it.

You will also need to increase the maximum word length to 40 characters to accommodate the length of an IPv6 address, select **Options > Preferences > Letters and words** and change the default value in the **Maximum word length** field from 32 to 40. Click **OK** to save and close the dialog.

These changes alone will not be enough though, character **58** (**:**) is a reserved character in dtSearch, to give terms a variable weighting in Boolean searches. To make this character searchable we need to modify the Windows Registry http://support.dtsearch.com/faq/dts0131.htm

CAUTION: The next section is intended for advanced users, administrators, and IT Professionals.

Serious problems might occur if you modify the registry incorrectly, follow the steps carefully. For extra protection, you may want to back up the registry first so that you can restore the registry if a problem occurs.

How to back up and restore the registry in Windows 10 (or 8):

(See https://support.microsoft.com/en-us/help/322756)

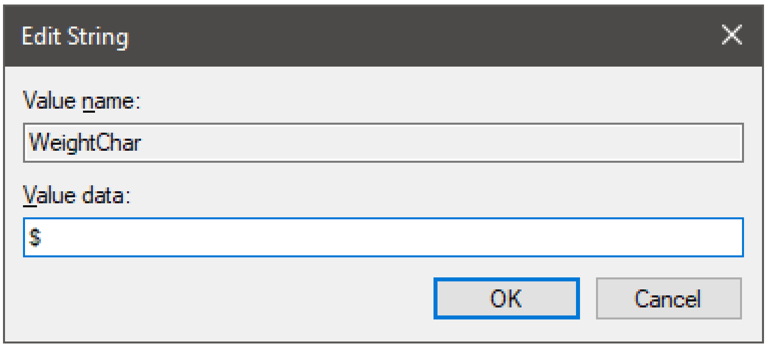
1. From the **Start** menu, type **regedit.exe** in the search box, and press **Enter**.

(You may be prompted for an administrator password or for confirmation).

2. In Registry Editor, locate and click **[HKEY_CURRENT_USER\Software\dtSearch Corp.\dtSearch\Settings]**.
3. Click **File** > **Export**.
4. In the **Export Registry File** dialog box, select where to save the backup, then type a name in the **File name** field.
5. Click **Save**.

Exit dtSearch and run RegEdit (See (1) in text box above for Windows 8 to 10) or for Windows 7: Use the keyboard combination Windows key + R or right-click the Start Menu to open Run. In Run, enter “regedit” (without quotes) then Click **OK.**

Open the key **[HKEY_CURRENT_USER\Software\dtSearch Corp.\dtSearch\Settings]** to access your dtSearch registry entries. Find WeightChar, **Right Click > Modify…** and edit the **Value data:** field from **:** to **$**



Edit String

Value name: WeightChar

Value data: $

Click OK and close the Registry Editor.

After making these changes, open dtSearch and rebuild the index, make sure that the alphabet file is `IP.abc`. After the rebuild you will be able to search for a full IPv6 address such as **2001:0db8:85a3:0000:0000:8a2e:0370:7334**.

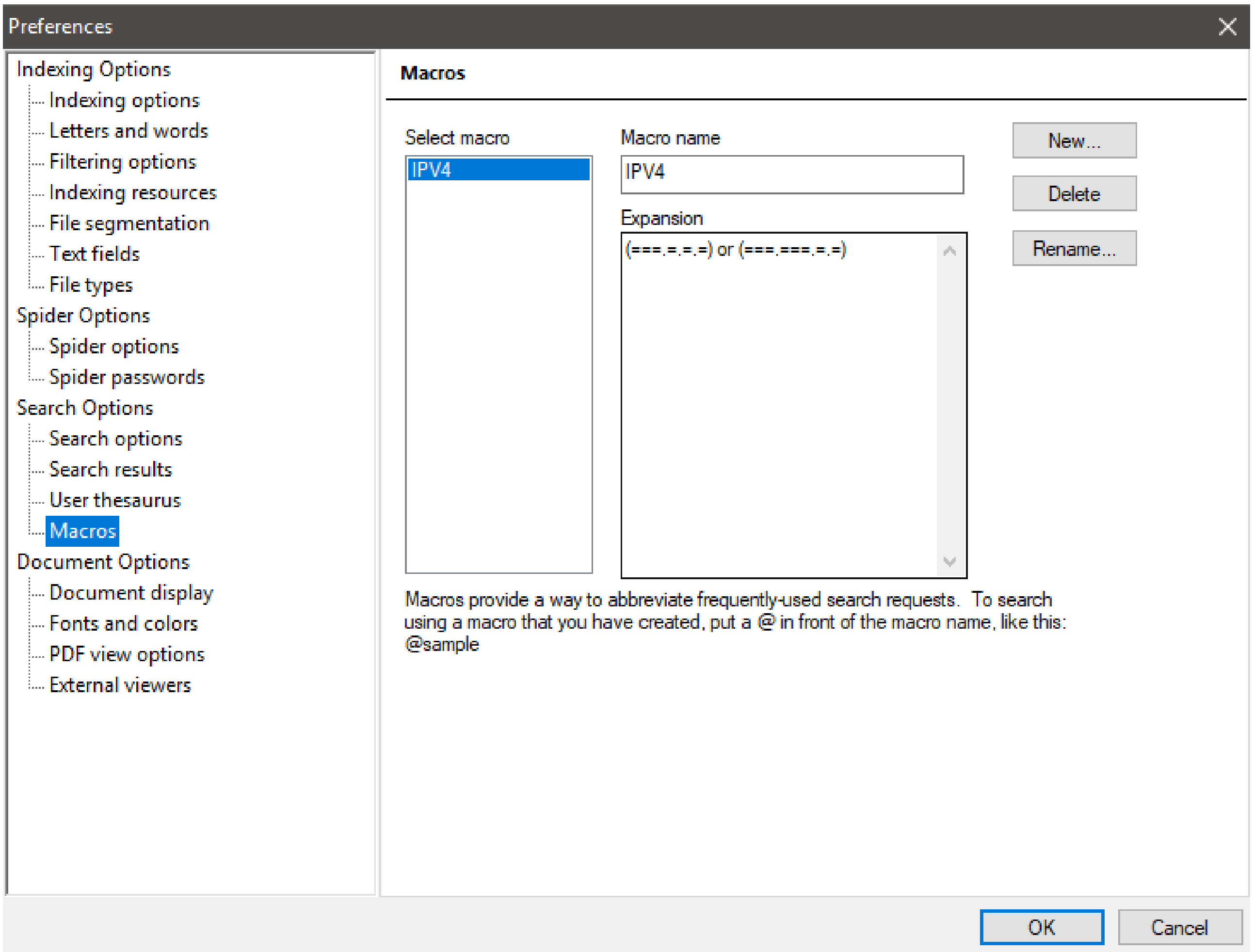
Using Macros and Regular Expressions

If you need to find all the IPv4 or IPv6 addresses in a collection of files, you could use the simple wildcard approach, but you would need to allow for all the different formats of addresses. For example, just to find IPv4 addresses 127.0.0.1 and 192.155.0.1 would require a search term of (===.=.=.= OR ===.===.=.=).

Macros

To avoid having to type in a long search query each time it is best to save the search query as a macro.

Select **Options > Preferences > Search Options > Macros** click **New...** and enter a name for your macro IPV4, enter the search query `(===.=.=.=)    OR  (===.===.=.=)` in the expansion text box, and press OK.



Select macro: IPV4

Macro name: IPV4

Expansion: (===.=.=.=) or (===.===.=.=)

Macros provide a way to abbreviate frequently-used search requests. To search using a macro that you have created, put a @ in front of the macro name, like this: @sample

Regular Expressions

To allow for all possible IP address formats would require a much longer search query.
An alternative to using a long wildcard search query is to use a Regular Expression.
See https://support.dtsearch.com/webhelp/dtsearch/regular__.htm for details of Regular Expression syntax in dtSearch.

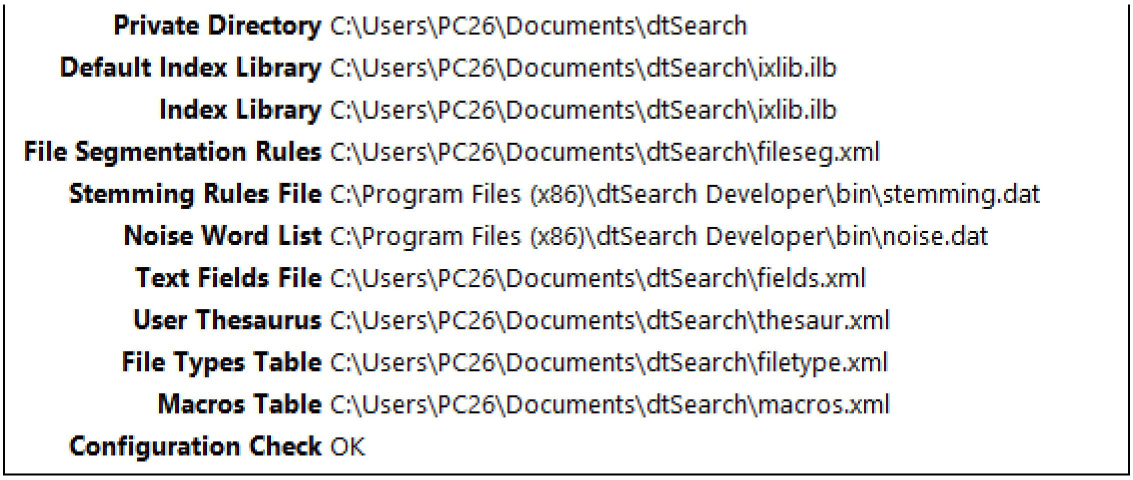
If you are not familiar with Regular Expressions, you may find it useful to use the example Macros supplied with the **User Thesaurus Plus** add-on product, available from https://www.dtsearch.co.uk

User Thesaurus Plus sample macros

User Thesaurus Plus 1.2 is supplied with IPv4, IPv6 and Bitcoin address sample macro files.

Initial set-up for use with dtSearch Desktop or Network

Open dtSearch Desktop, select **Help > About dtSearch...** and scroll to the **dtSearch Configuration** section.



Private Directory	C:\Users\PC26\Documents\dtSearch
Default Index Library	C:\Users\PC26\Documents\dtSearch\ixlib.ilb
Index Library	C:\Users\PC26\Documents\dtSearch\ixlib.ilb
File Segmentation Rules	C:\Users\PC26\Documents\dtSearch\fileseg.xml
Stemming Rules File	C:\Program Files (x86)\dtSearch Developer\bin\stemming.dat
Noise Word List	C:\Program Files (x86)\dtSearch Developer\bin\noise.dat
Text Fields File	C:\Users\PC26\Documents\dtSearch\fields.xml
User Thesaurus	C:\Users\PC26\Documents\dtSearch\thesaur.xml
File Types Table	C:\Users\PC26\Documents\dtSearch\filetype.xml
Macros Table	C:\Users\PC26\Documents\dtSearch\macros.xml
Configuration Check	OK

Select the path displayed after **User Thesaurus** and **Copy** it **(**right-click > copy or Ctrl+C).

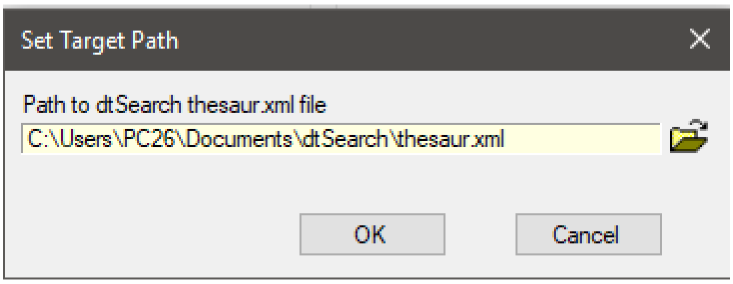
If you have edited the macro file in dtSearch Desktop you can import it into User Thesaurus Plus so that you can more easily edit it in the future. Click on **File > Import file** and select the file.

You will be prompted to rename the file for identification in User Thesaurus Plus. Press OK to copy the file into the User Thesaurus Plus data folder.

Open User Thesaurus Plus, go to **Settings > Target path**, and **paste** in the file path.

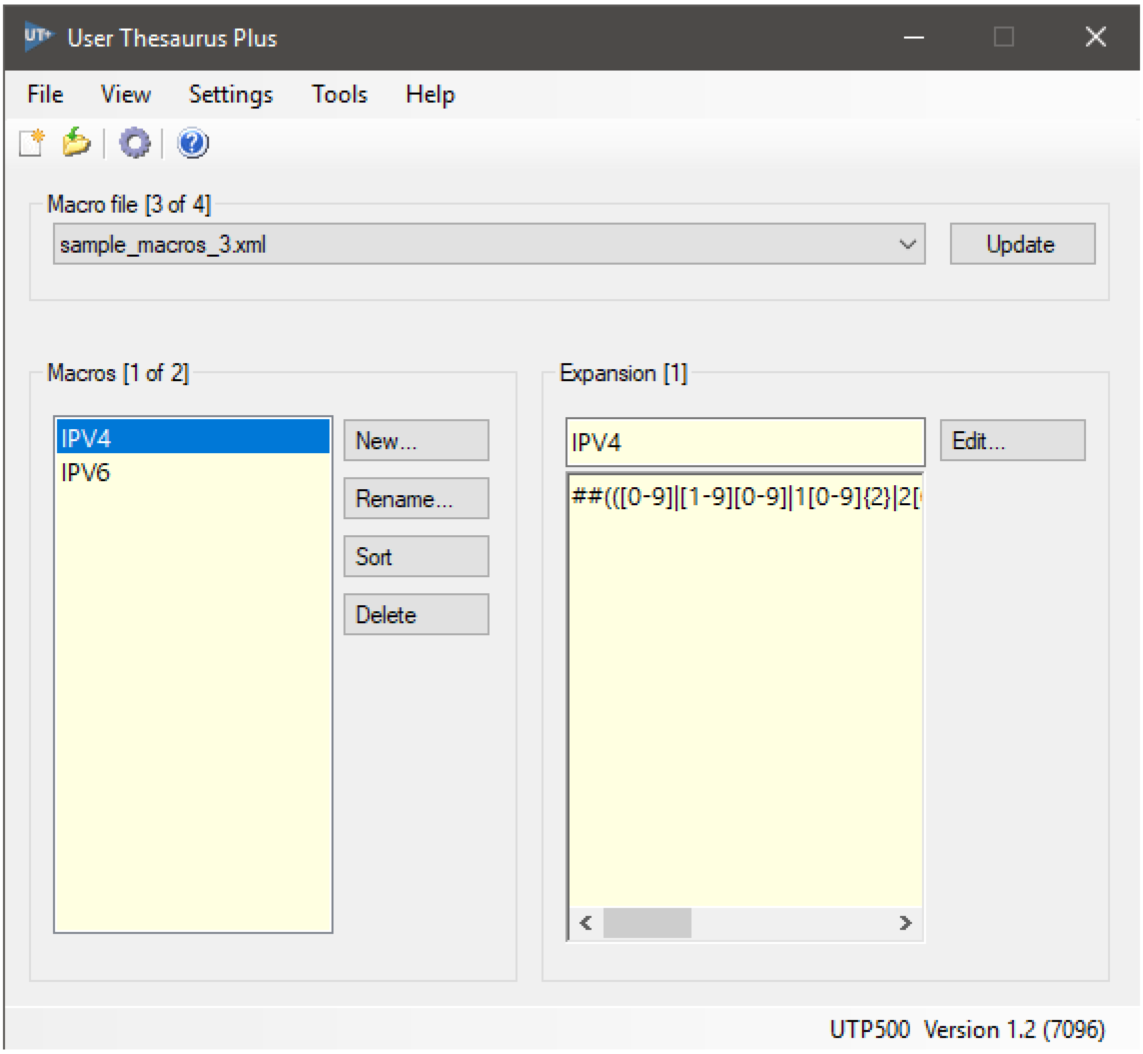
You will be prompted to update the Target file. **Warning:** Selecting **Yes** will **overwrite** your current thesaur.xml file.

*NOTE: You may need to change user permissions so that you have read/write access to the macro and user thesaurus files. On Windows 7 it is advisable to save the file in the User/AppData folder or Documents folder.



C:\Users\PC26\Documents\dtSearch\thesaur.xml

Select **View** and choose **Macro**.   Select the sample_macros_3.xml file from the drop-down list and click **Update** to make the changes effective in dtSearch. dtSearch does not have to be closed for the change to take effect.



Macro file [3 of 4]
sample_macros_3.xml

Macros [1 of 2]
IPV4
IPV6

Expansion [1]
IPV4
##(([0-9]|[1-9][0-9]|1[0-9]{2}|2[

UTP500 Version 1.2 (7096)

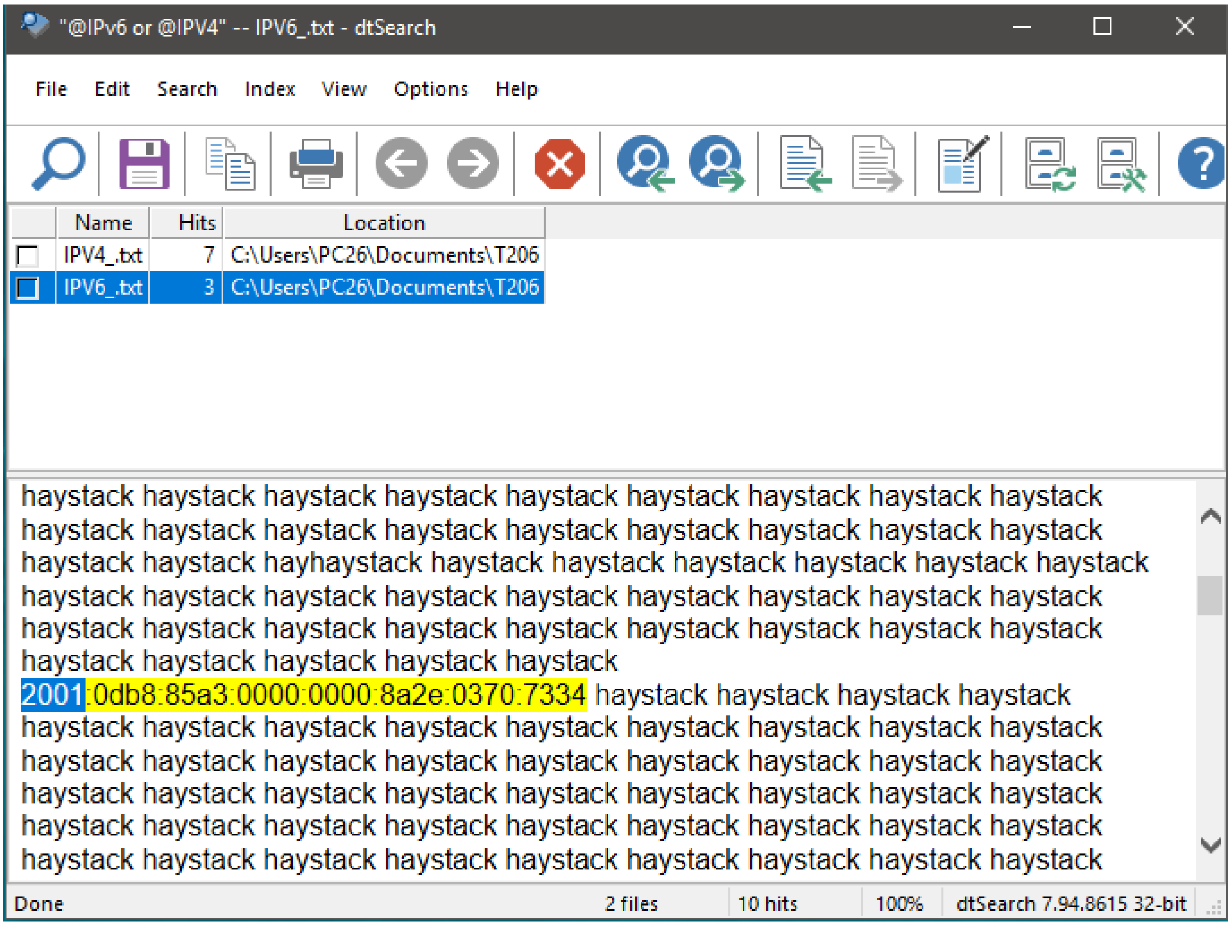
When not in use, User Thesaurus Plus can be closed or minimised to the taskbar. All changes are saved automatically.

User Thesaurus Plus lets you choose the User Synonyms or Macro file in use by dtSearch Desktop to get more focused search results. It allows you to create your own thesaurus and macro files, merge files or choose from over 30 included files. Macros and Synonym rings can also be sorted within each macro or thesaurus file to for ease of use and to obviate duplicates.

User Thesaurus Plus also includes an alphabet file editor for all currency signs.

Searching for IP addresses using the sample macros

In dtSearch Desktop open the search dialog, select the T206 index and enter **`@IPV4`** to search for all IPv4 addresses, enter **`@IPV6`** to search for all IPv6 addresses, or enter **`@IPV4 or @IPV6`** to find both types. The search results should show seven IPv4 addresses hit-highlighted or three IPv6 addresses hit-highlighted.


"@IPv6 or @IPV4" -- IPV6_.txt - dtSearch
File Edit Search Index View Options Help

	Name	Hits	Location
□	IPV4_.txt	7	C:\Users\PC26\Documents\T206
□	IPV6_.txt	3	C:\Users\PC26\Documents\T206

haystack haystack haystack haystack haystack haystack haystack haystack haystack
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2001:0db8:85a3:0000:0000:8a2e:0370:7334 haystack haystack haystack haystack
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Done 2 files 10 hits 100% dtSearch 7.94.8615 32-bit

APPENDIX

T206 test documents

Download T206.zip from this link: T206.zip . Unzip the file (right-click and select **Extract All...)**. Put the extracted T206 folder into the **Documents** folder on each student's PC.

The IPV4_.txt and IPV6_.txt files contain several IP addresses mixed in with regular text.

The `Example Purchase Order.txt` file is meant to demonstrate how typical trade documents such as invoices, purchase orders, commercial invoices or credit notes can be found by a reference number (which typically start with one or more letters) can be found even if indexing of numbers is turned off to save indexing space. (http://tfig.unece.org/contents/trade-documents.htm)

NOTES:

dtSearch Desktop v7.85 to v7.94: ensure that in **Options|Preferences|Fonts and Colors** the **multiple colors** hit-highlighting option is **not** selected.
dtSearch 7.95 Fixed: multicolour hit highlighting did not work with a search request that included a regular expression with the **(** character as part of the regular expression pattern.

User Thesaurus Plus. User thesaurus Plus 1.1 includes an IPv4 macro only; version 1.2 includes IPv4, IPv6 and Bitcoin address macros. (The dtSearch macro.xml and thesaur.xml files must be in the same folder and allow read/write access. You may need to run User Thesaurus Plus 'as Administrator').

Macros for Regular Expressions in dtSearch need to start with ##

Screenshots

The screenshots used in the article are from dtSearch Desktop 7.94 running on Windows 10. To make the title bars easier to distinguish the default white theme was changed. If you want to do this in Windows 10 go to **Settings>Personalization>Colours,** uncheck **Automatically pick an accent** colour from my background, check the **title bars** checkbox. Choose a custom colour such as 'storm'.

Accessibility

If you are running a training session for a group, it's important that all participants can see (and hear) projected screens or other material (e.g. PowerPoint slides) and those that need extra contrast or other assistive technologies are catered for. Changing the mouse pointer scheme to inverted extra-large and using the **Display pointer trails** option can be beneficial, these can be edited in Windows 10 from **Settings>Themes>Mouse pointer**. For more information see: https://www.w3.org/WAI/teach-advocate/accessible-presentations/

In dtSearch Desktop the font size in the Search Dialog can be increased from the **Options|Search Dialog Font Size…** menu. The Search Results can also be increased in size by holding down the **Ctrl** button and scrolling the mouse. The Zoom % is displayed in the status bar alongside the dtSearch version number.