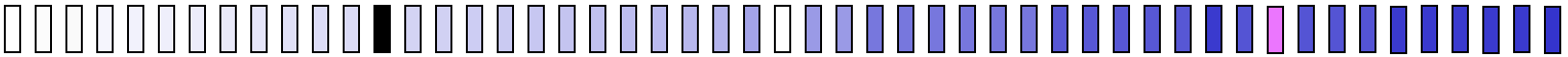
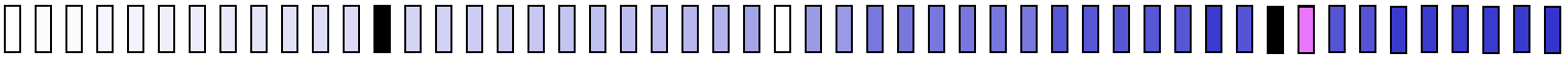
Additional NLS Tools

- Knowledge Source Server Java Client API
- NLS's Java NLP tools
- MMTx
- GSpell



Knowledge Source Server Java Client API

- XML over RMI
- Java UMLS Object Model



UMLS Knowledge Source Server (UMLSKS)

UMLSKS Version 2.1 UMLS Releases: 2002 2002AB

Metathesaurus Semantic Network SPECIALIST Lexicon

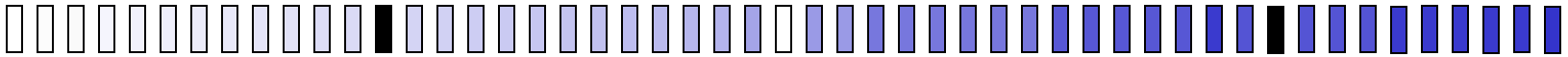
Documentation Resources Views/Profiles Logout

UMLSKS User's Guide

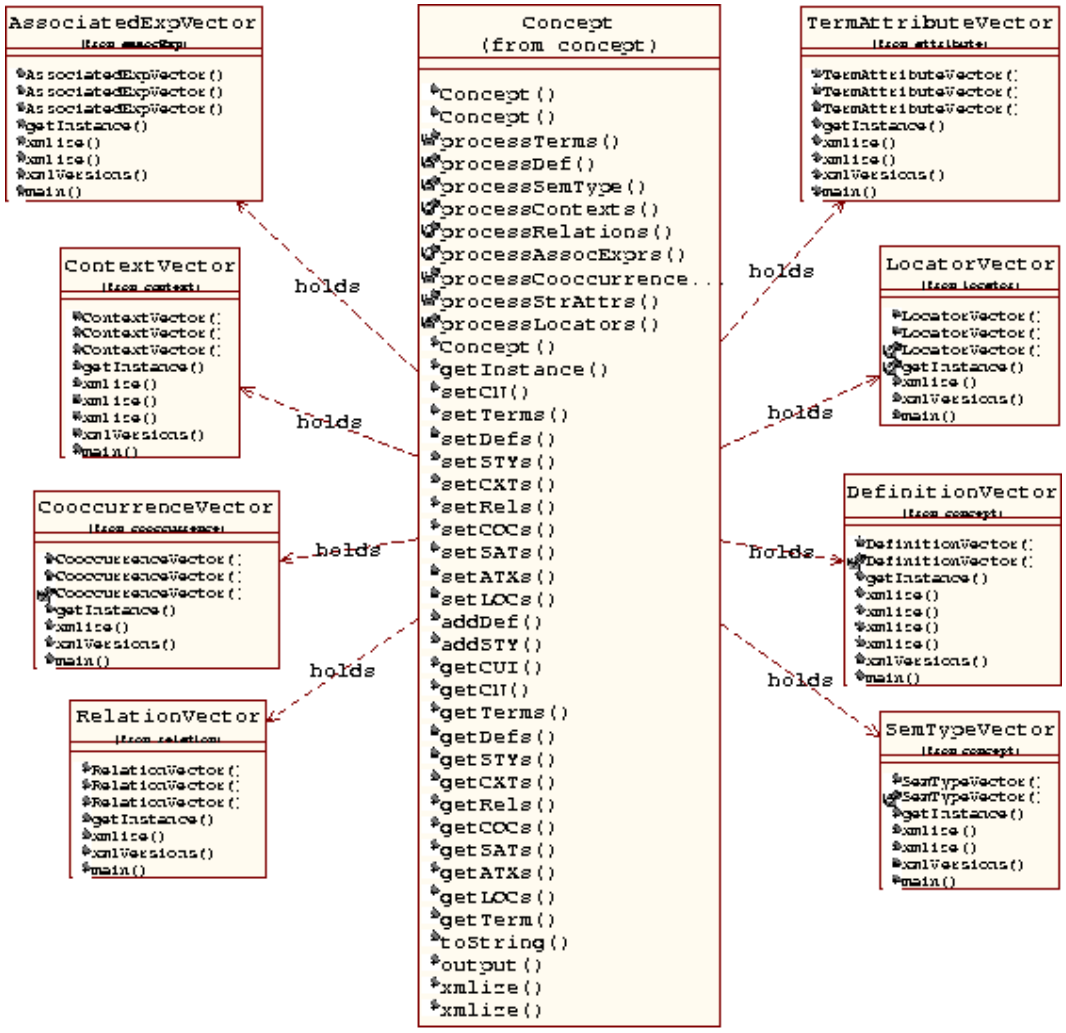
UMLSKS API Download and Documentation

Chapter 5. Building UMLSKS Software Applications

Chapter Contents:

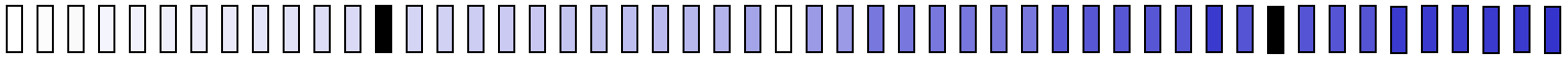


Knowledge Source Server Java



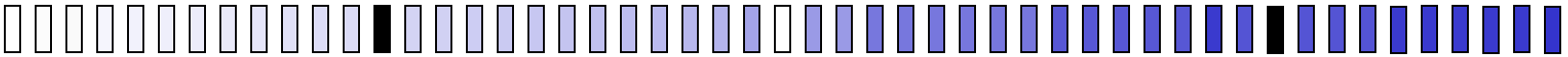
Knowledge Source Server Java Client API

```
// ======================+ Initialize the client +==
KSSRetrieverV2_1 retriever = (KSSRetrieverV2_1)
   Naming.lookup("//umlsks.nlm.nih.gov/KSSRetriever");
// ====================+ Send a request to client +==
char[] result = retriever.findBasicConcept(ksYear,
                                           termName,
                                               sabs,
                                           language,
                                KSSRetriever.NormalizeString,
                                              false );
// ====================+ Convert the XML into ... +==
ConceptVector concepts = ConceptVector.getInstance(
                                       String.valueOf(result))
```



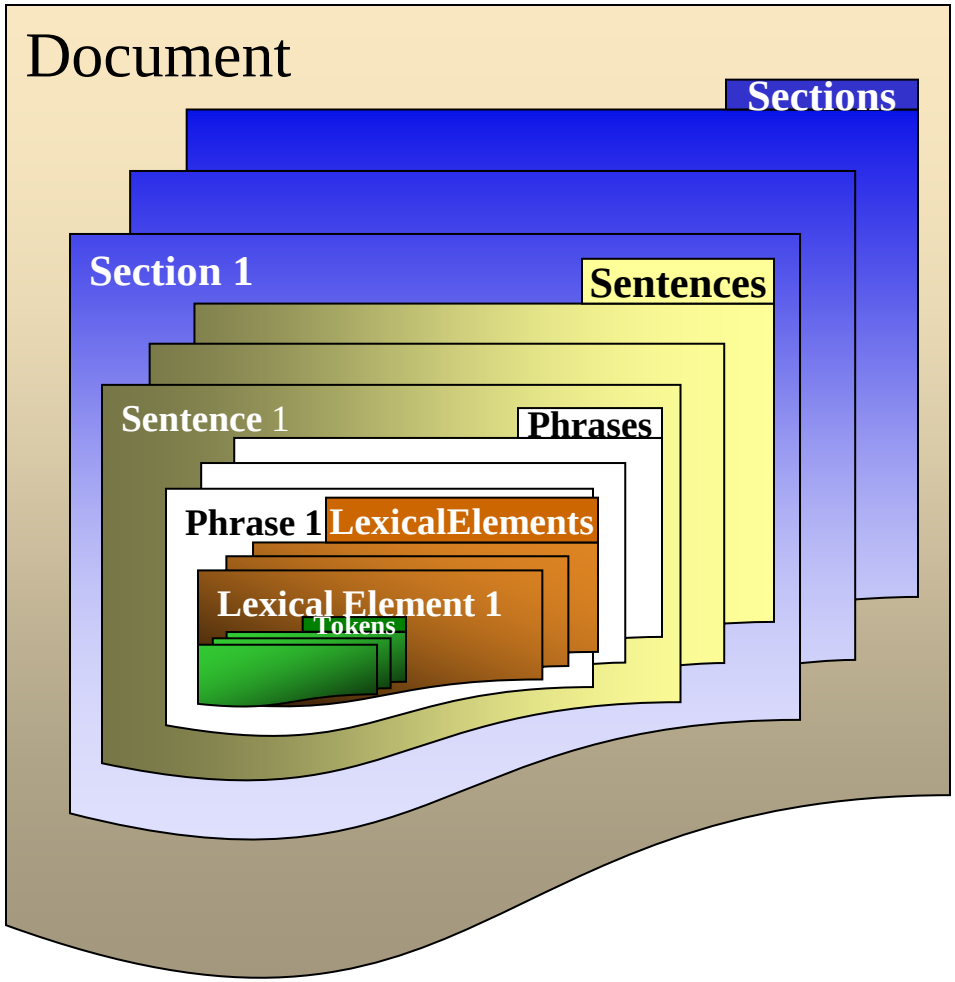
Knowledge Source Server Java Client API

```
<concept>
    <cui>C0032615</cui>
    <cn>Fatty Acids, Polyunsaturated</cn>
    <term>
      <lui>L0032615</lui>
      <tn>Fatty Acids, Polyunsaturated</tn>
      <ts>P</ts>
      <lat>ENG</lat>
      <termVariant>
        <sui>S0010240</sui>
        <stt>VW</stt>
        <str>Acids, Polyunsaturated Fatty</str>
        <strSource>
          <sab>MSH2002</sab><tty>PM</tty><scd>D005231</scd><srl>0</srl>
```



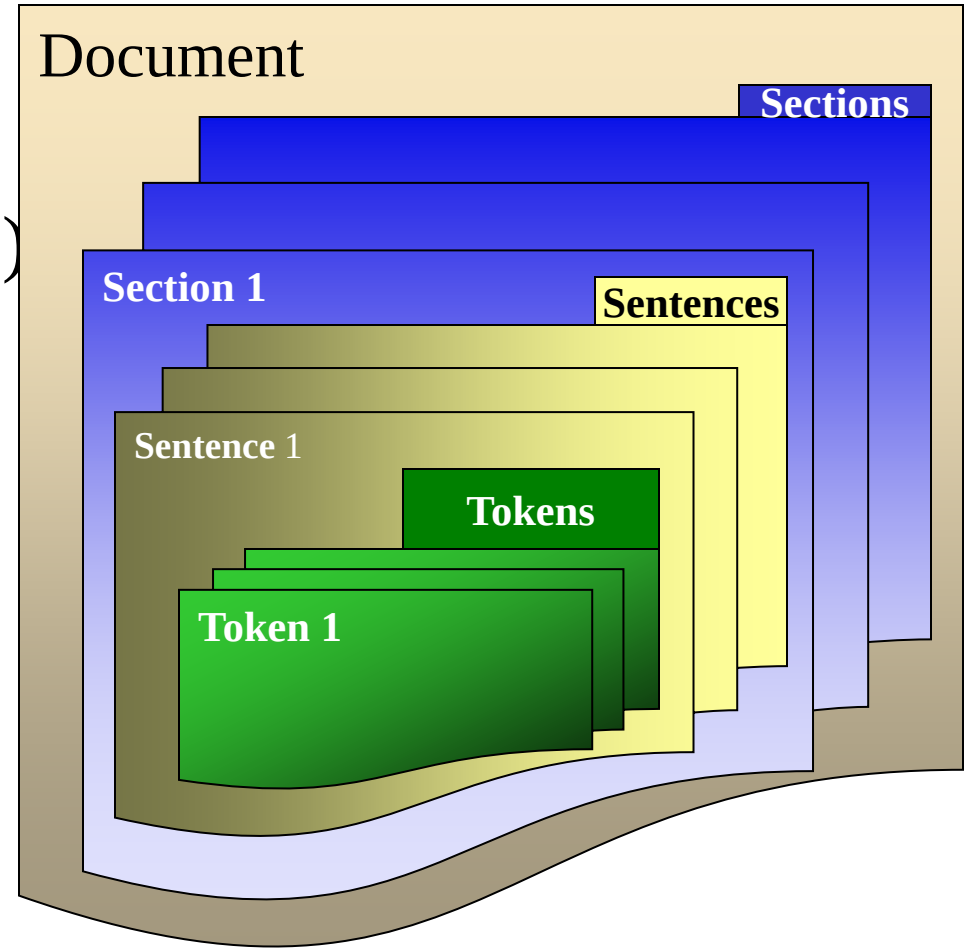
NLS Java NLP Tools

- Tokenizer
- Lexical Lookup
- NP Parser
  - Document Centric
  - Java Programs and API's



Java NLP Tools: Tokenizer

- Tokenizes text into
  - Sections (paragraphs)
  - Sentences
  - Tokens
- Can handle
  - FreeText
  - HTML
  - MedLINE Abstracts



Java NLP Tools: Tokenizer

Usage

tokenize.[*bat*|*sh*] [*Options*]

--fileName=*fileName*

--outputFileName=*fileName*

--inputType=[*freeText*|*HTML*|*medlineCitations*]

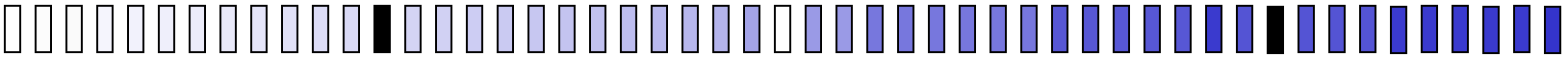
--sections

--sentences

--tokens

--pipedOutput

--indicate_citation_end

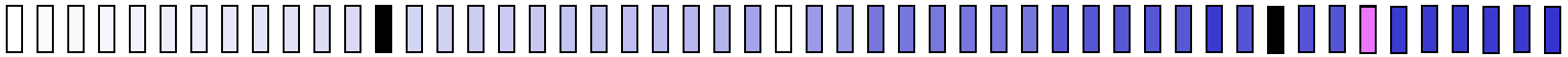


Java NLP Tools: Tokenizer

```
tokenize.bat --inputFile=5.txt --inputType=freeText --sentences --tokens
             --pipedOutput
```

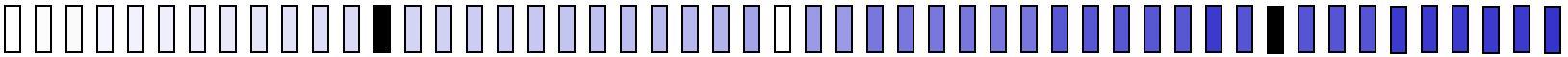
Sentence|1|97|182|But those follow-up tests have been inconclusive, state and federal officials said.

Token|16|97|99|0|0|**But**|||
Token|17|101|105|1|0|**those**|||
Token|18|108|113|2|0|**follow**|||
Token|19|114|114|2|0|**-**|||
Token|20|115|116|3|0|**up**|||
Token|21|118|122|4|0|**tests**|||
Token|22|124|127|5|0|**have**|||
Token|23|129|132|6|0|**been**|||
Token|24|134|145|7|0|**inconclusive**|||



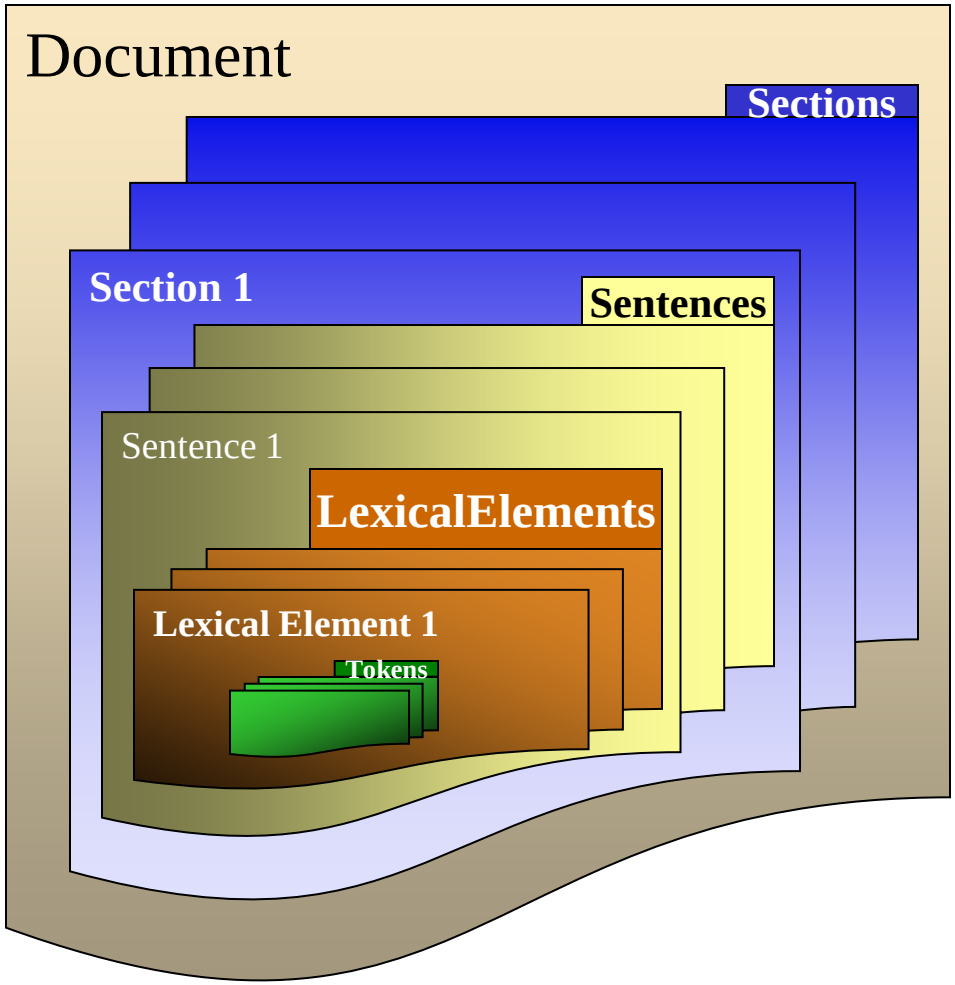
Java NLP Tools: Tokenizer

```
// ==============+ Create a TokenizeAPI object +==
TokenizeAPI tokenizer = new TokenizeAPI( argv );
// ========================+ Tokenize the file +==
Document aDocument =
             tokenizer.processDocument( aFile);
Vector       tokens = aDocument.getTokens() ;
int numberOfTokens = tokens.size();
Token        aToken = null;
// ====================+ Print the tokens out +==
for ( int i = 0; i < numberOfTokens; i++ ) {
  aToken = (Token) tokens.get(i);
  System.out.println( aToken.toPipedString() );
}
```



NLP Tools: Lexical Lookup

- Chunks tokens into terms
  - From SPECIALIST Lexicon
  - From regular expressions



Java NLP Tools: Lexical Lookup

Usage

LexicalLookup.[*bat*|*sh*] [*Options*]

--fileName=*fileName*

--outputFileName=*fileName*

--inputType=[*freeText*|*HTML*|*medlineCitations*]

--sections

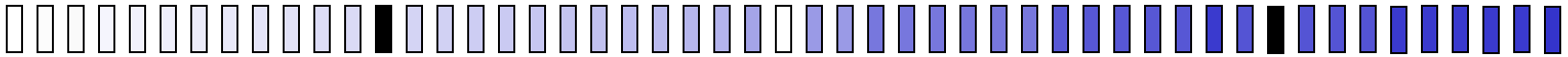
--sentences

--lexicalElements

--lexicalEntries

--tokens

--pipedOutput



Java NLP Tools: Lexical Lookup

```
LexicalLookup.bat --inputFile=5.txt --inputType=freeText
                  --lexicalElements --lexicalEntries --pipedOutput
```

Lexical Element|17|LEXICON|prep|**But**|97|99

LexicalEntry|but|conj|base|E0014465

LexicalEntry|but|prep|base|E0014464

Lexical Element|18|LEXICON|det|**those**|101|105

LexicalEntry|those|det|plural|E0060728

LexicalEntry|those|pron|base|E0060729

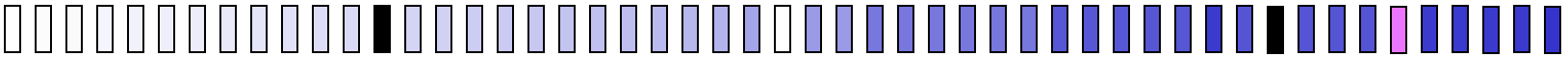
Lexical Element|20|LEXICON|adj|**follow-up**|108|116

LexicalEntry|follow-up|adj|base|E0028422

Lexical Element|23|LEXICON|noun|**tests**|118|122

LexicalEntry|tests|verb|pres3s|E0060349

LexicalEntry|tests|noun|plural|E0060348



Java NLP Tools: Lexical Lookup

```
LexicalLookup.bat --inputFile=5.txt --inputType=freeText
                  --lexicalElements --lexicalEntries --pipedOutput
```

Lexical Element|12|SHAPE:Unlabeled|*unknown*|**Richmond**|67|74

Lexical Element|13|LEXICON|prep|**for**|76|78

Lexical Element|14|LEXICON|adj|**further**|80|86

Lexical Element|15|LEXICON|verb|**testing**|88|94

Lexical Element |16|PUNCTUATION|punctuation|**.**|95|95

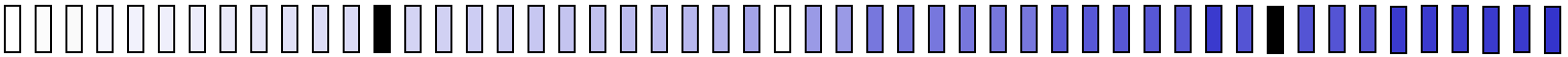
Lexical Element |17|LEXICON|prep|**But**|97|99

Lexical Element |18|LEXICON|det|**those**|101|105

Lexical Element |20|LEXICON|adj|**follow-up**|108|116

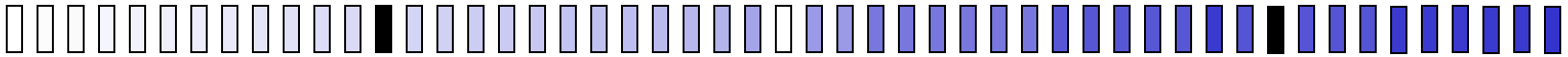
Lexical Element |23|LEXICON|noun|**tests**|118|122

Lexical Element |24|LEXICON|aux|**have**|124|127



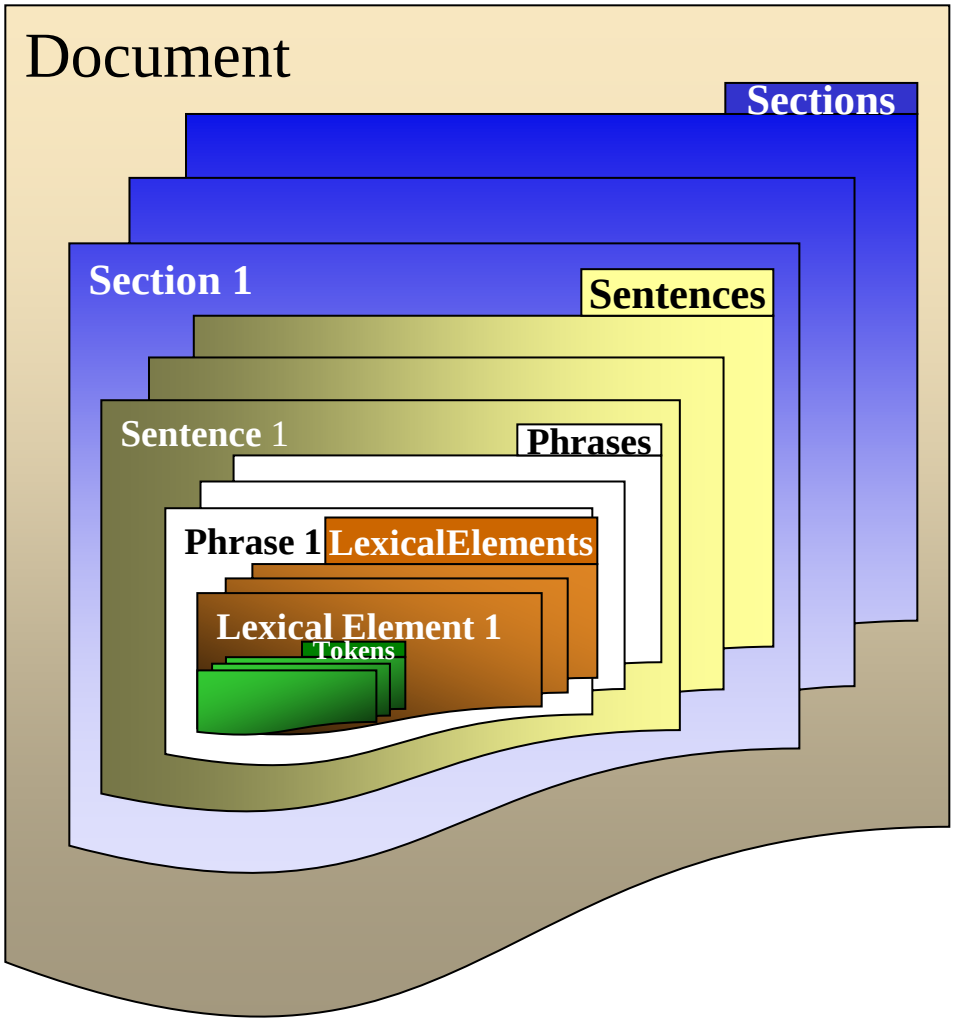
Java NLP Tools: Lexical Lookup

```
// ==========+ Create a LexicalLookupAPI object +==
LexicalLookupAPI look = new LexicalLookupAPI(argv);
// ============================+ Chunk the file +==
Document aDocument = look.processDocument( aFile );

Vector les = aDocument.getLexicalElements();
int numberOfLexElements = les.size();
LexicalElement aLexElement = null;
// =============+ Print the LexicalElements out +==
for (int i = 0; i< numberOfLexElements; i++ ) {
  aLexElement = (LexicalElement) les.get(i);
  System.out.println(aLexElement.toPipedString());
}
```



NLP Tools: NpParser

- Chunks sentences into simple phrases



Java NLP Tools: NpParser

Usage

npParser.[*bat*|*sh*] [*Options*]

--fileName=*fileName*

--outputFileName=*fileName*

--inputType=[*freeText*|*HTML*|*medlineCitations*]

--sections

--sentences

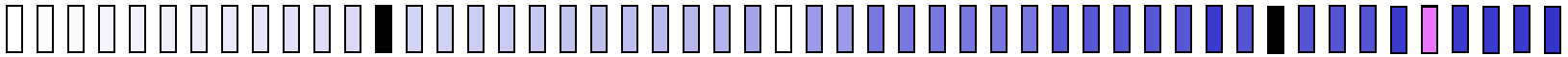
--phrases|**--nps**|**--mincoMan**

--lexicalElements

--lexicalEntries

--tokens

--pipedOutput



Java NLP Tools: NpParser

```
npParser.bat --inputFile=5.txt --inputType=freeText --phrases
                --pipedOutput
```

Phrase|0|0|10|**The company**|*company*

Phrase|1|12|14|**has**|

Phrase|2|16|24|**forwarded**|

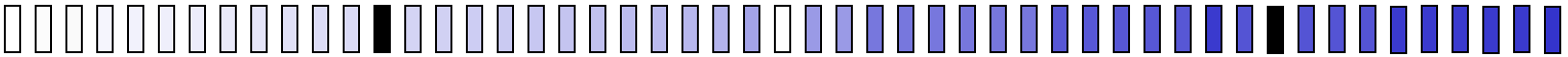
Phrase|3|26|39|**some materials**|*materials*

Phrase|4|41|62|**to a state laboratory**|*state laboratory*

Phrase|5|64|74|**in Richmond**|*Richmond*

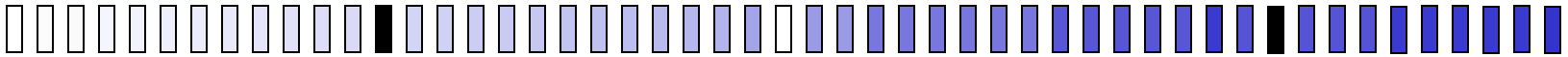
Phrase|6|76|86|**for further**|*further*

Phrase|7|88|94|**testing**|



Java NLP Tools: NpParser

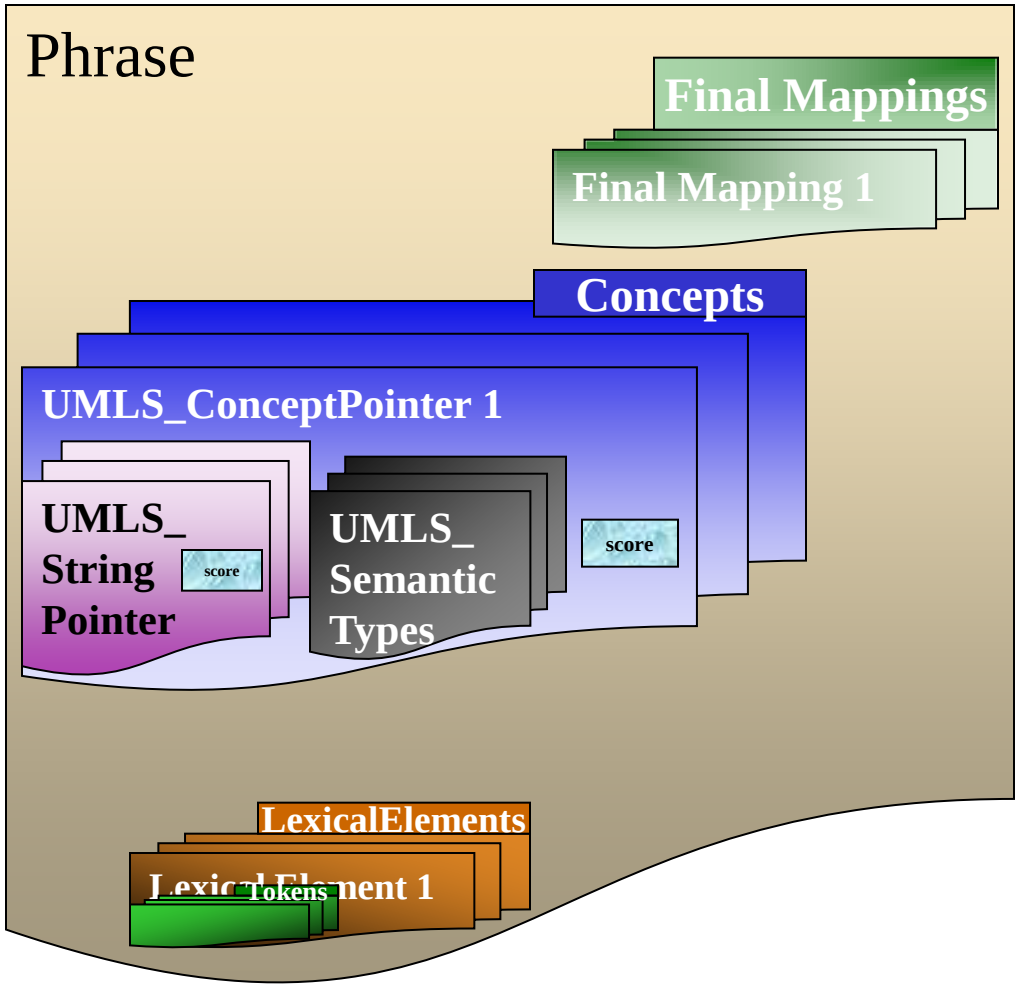
```
// ======================+ Create a Parser object +==
Parser parser = new Parser( argv );
// ============================+ Parse the file +==
Document aDocument = parser.processDocument(aFile);

Vector      phrases = aDocument.getPhrase() ;
Int numberOfPhrases = phrases.size();
Phrase      aPhrase = null;
// ======================+ Print the Phrases out +==
for ( int i = 0; i < numberOfPhrases; i++ ) {
  aPhrase = (Phrase) phrases.get(i);
  System.out.println( aPhrase.toPipedString() );
}
```



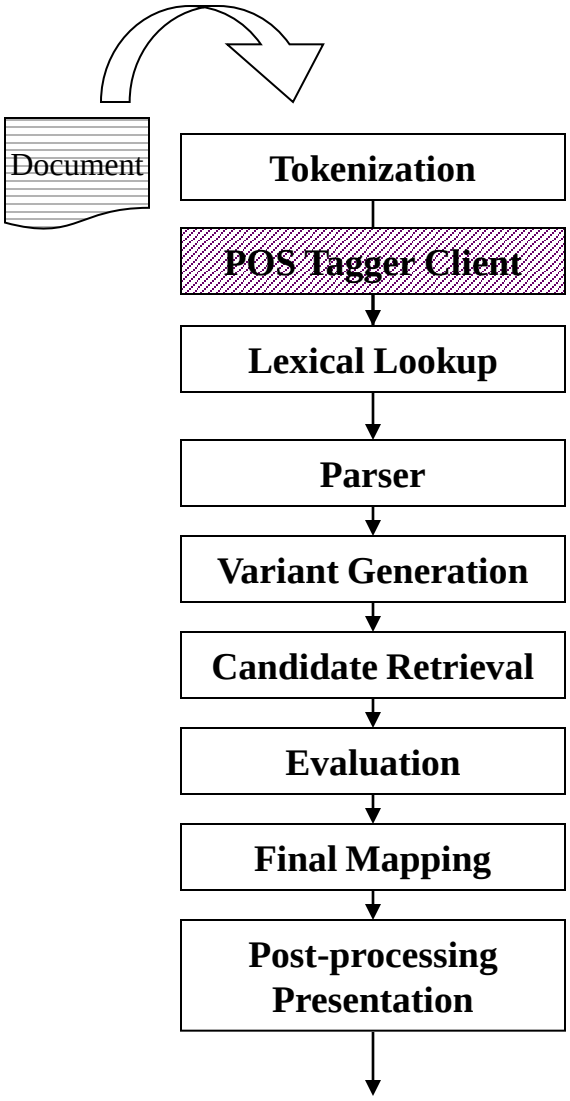
MMTx

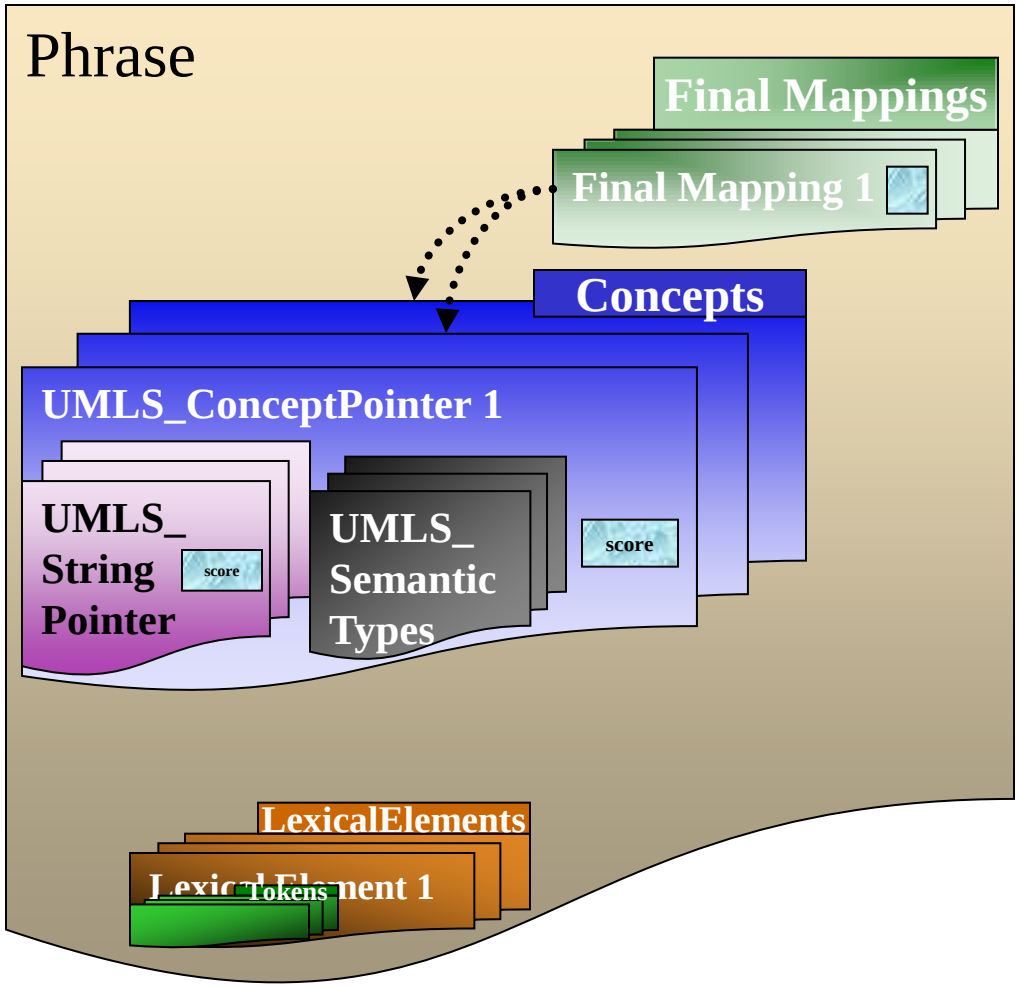
MetaMapTechnology Transfer

- Maps text phrases to Metathesaurus concepts
- Java Implementation of MetaMap



MMTx

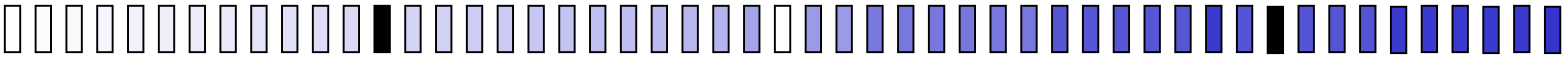

Document
Tokenization
POS Tagger Client
Lexical Lookup
Parser
Variant Generation
Candidate Retrieval
Evaluation
Final Mapping
Post-processing
Presentation


Phrase
Final Mappings
Final Mapping 1
Concepts
UMLS_ConceptPointer 1
UMLS_
String
Pointer
score
UMLS_
Semantic
Types
score
LexicalElements
Tokens

MMTx

Usage

MMTx [<*options*>] [**--fileName**=*infile*]
[**outputFileName**=*outfile*]
--strict_model|**--moderate_model**|**--relaxed_model**
--KSYear=*year*|**--mm_data_version**=*customName*
--threshold=*lowestScore*
--truncate_candidates_mappings
--term_processing|**--allow_overmatches**|**--allow_concept_gaps**
--composite_phrases
--prefer_multiple_concepts
--fielded_output

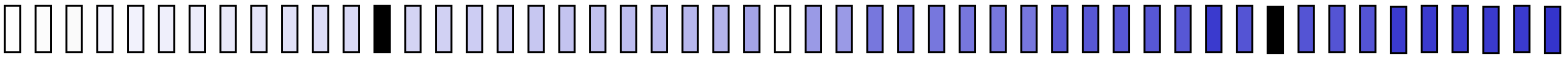


MMTx

```
MMTx --inputFile=5.txt --inputType=freeText
```

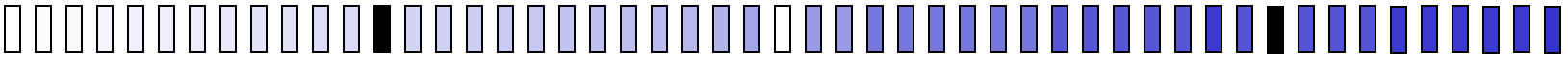
Processing 00000000.tx.3: ***One problem*** *is caused by the VecTest itself, which uses a* ***dipstick*** *to* ***measure*** *the* ***presence*** *of a* ***protein*** *associated with the* ***parasite*** *that causes* ***malaria****.*

Phrase: "**One problem**"
Meta Candidates (2)
  861 Problem, NOS [Finding,Pathologic Function]
  694 One [Quantitative Concept]
Meta Mapping (888)
  694 One [Quantitative Concept]
  861 Problem, NOS [Finding,Pathologic Function]

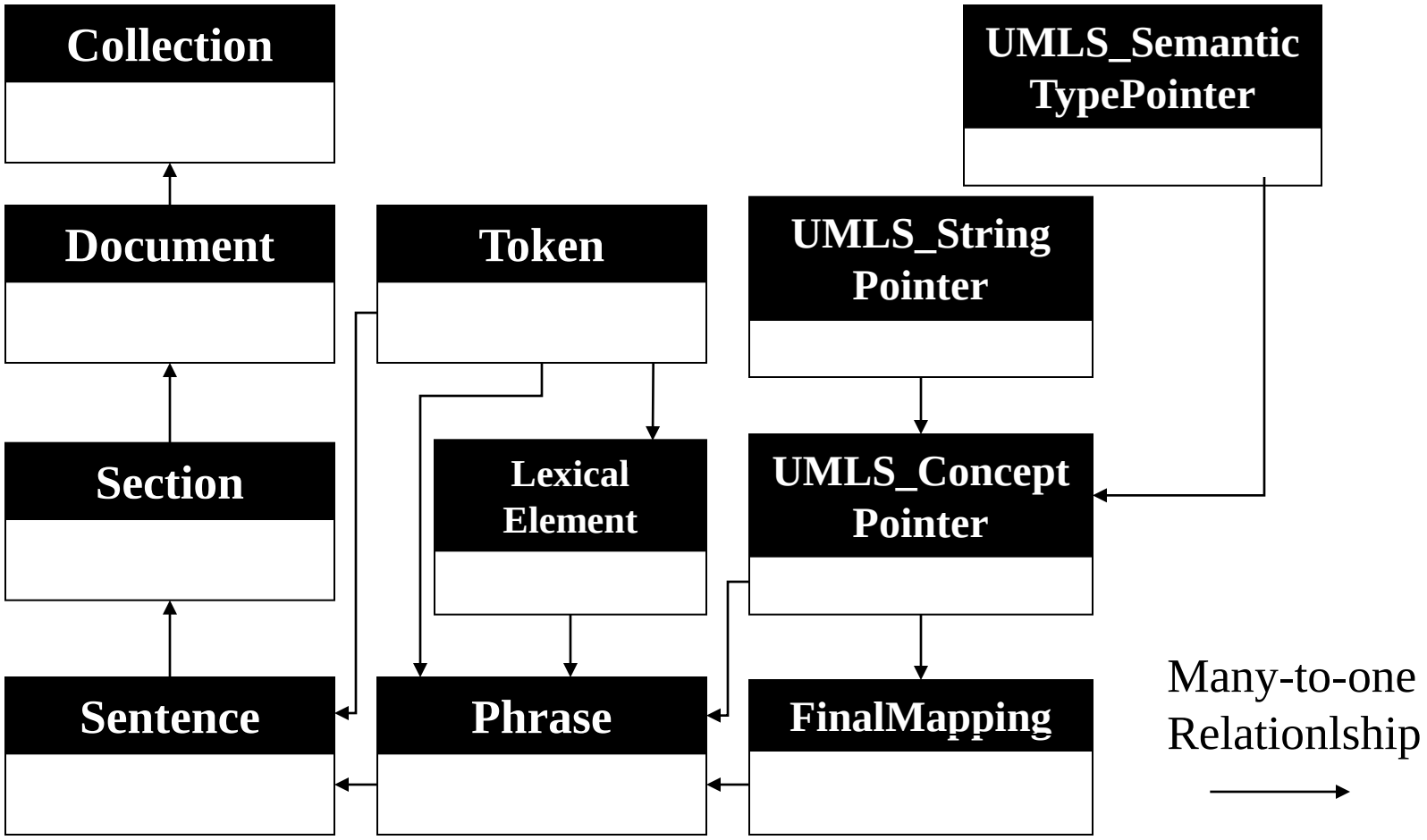


MMTx

```
// ==================+ Create a MMTxAPI object +==
MMTxAPI mmtx = new MMTxAPI( argv );
// ========================+ Analyze the file +==
Document aDocument = mmtx.processDocument(aFile);

Vector      phrases = aDocument.getPhrases() ;
int numberOfPhrases = phrases.size();
Token       aPhrase = null;
// ====================+ Print the Phrases out +==
for ( int i = 0; i < numberOfPhrases; i++ ) {
  aPhrase = (Phrase) phrases.get(i);
  finalConcepts = aPhrase.getFinalMappings();
}
```



Useful Text Feature Classes

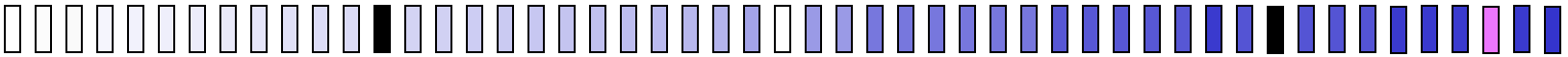


GSpell

"Gottlieb, I think I know why we've been receiving so few commissions."

GSpell

- Spelling suggestion tool
- Pure Java application with Java API’s
- Support for multi word dictionary entries



GSpell: Usage

Usage

GSpellFind.[*sh*|*bat*]

--**dictionary**=*NameOfDictionary*

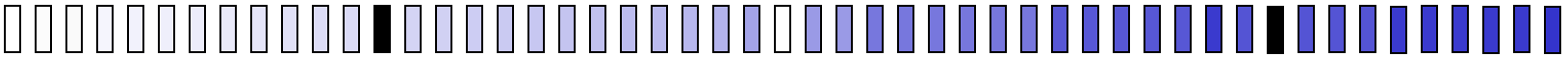
[--**inputFile**=*Source*] [--**outputFile**=*target*]

[--**truncate**=*N*] [--**considerNCandidates**=*N*]

[--**maxEditDistance**=*N*]

[--**fieldedText**] [--**termField**=*X*] [--**correctField**=*Y*]

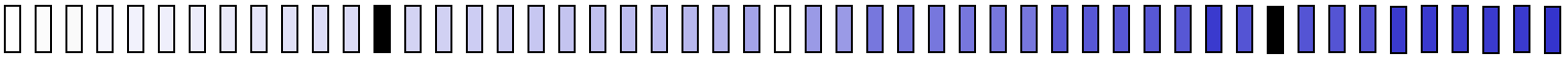
[--reportTime] [--version][--help]



GSpell: Example

Input Term	Suggestion	Edit Distance	Rank	Method	Message

anonomous|**anonymous**|1.0|0.8734230160180236|NGrams|
anonomous|**allonomous**|2.0|0.581967226738810 8|NGrams|
anonomous|**autonomous**|2.0|0.581967226738810 8|NGrams|
anonomous|**anadromous**|3.0|0.295816019208204 8|NGrams|
anonomous|**analogous**|3.0|0.295816019208204 8|NGrams|
anonomous|**anomalous**|3.0|0.295816019208204 8|NGrams|
anonomous|**anonymously**|3.0|0.295816019208248|NGrams|
anonomous|**anonymes**|3.0|0.295816019208204 8|Metaphone|
anonomous|**anonyms**|3.0|0.295816019208204 8|Metaphone|
anonomous|**acoprous**|4.0|0.1147081070210252 1|NGrams|



GSpell: Indexing

Usage

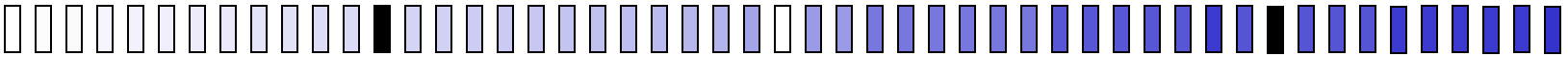
GSpellIndex.[*sh*|*bat*]

--dictionary=*NameOfDictionary*

--inputFile=*SourceFile*

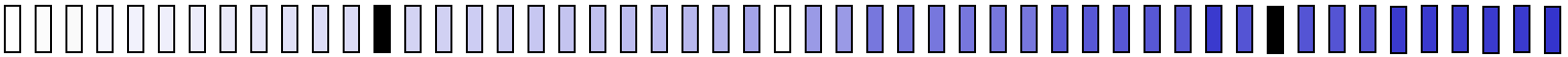
[--reportTime] [--version][--help]

- Format for the input file
  - One word per line



GSpell: Developer's Guide

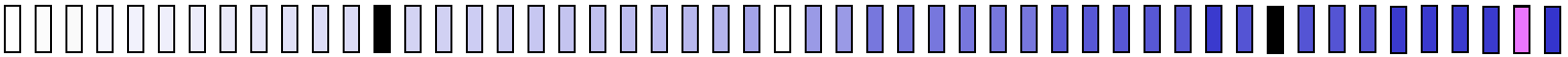
```
import gov.nih.nlm.nls.gspell.GSpell;       // <-------These come from the gspell.jar
import gov.nih.nlm.nls.gspell.Candidate;

GSpell gspell = new GSpell( _dictionaryName,
                            GSpell.READ_ONLY );
candidates = gspell.find( aTerm );
if ( candidates != null )
  for ( int i = 0; i < candidates.length; i++ )
     System.out.println(candidates[i].toString());
 else
    System.out.println("No Suggestions");

gspell.cleanup();
```



Downloadable Resources

- umlsks.nlm.nih.gov
- umlsLex.nlm.nih.gov
  - Lvg
  - Java NLP Tools
  - GSpell
- mmtx.nlm.nih.gov *

* Requires a UMLS Licience Aggreement



Lexical Tools for UMLS Developers

November 10, 2002

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National Library of Medicine

Lexical Systems: umlsLex.nlm.nih.gov

Email: umlslex@nlm.nih.gov

Knowledge Source Server: http://umlsks.nlm.nih.gov

UMLS Information: http://umlsInfo.nlm.nih.gov

Appendix

NormExample.java

LvgExampleEasy.java

LvgExampleHarder.java

LvgExampleEvenHarder.java

TokenizeExample.java

LexicalLookupExample.java

NpParserExample.java

MMTxExample.java

GSpellExample.java

5.txt

5.tokenized

5.lexicalLookuped

5.parsed

5.mmtxed