Lucene - die Volltext Suchmaschine

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Ziel des Vortrags

Eine kurze Einführung in Lucene

Vorstellen anhand eines kleinen Beispielprogramms

Tools, Suchmaschinen und anderes

Was ist „Lucene“

Eine Volltextsuche

Apache project (java)

Eine No-Sql Datenbank

Eine sehr schnelle Suchmaschine

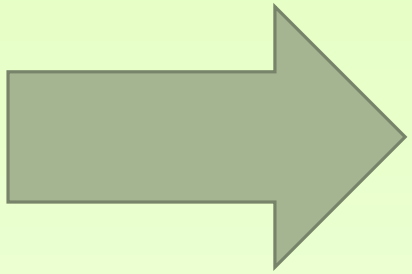
Lucene.Net ist eine Portierung des java codes (dll)

Inverted Index / Wie funktioniert Lucene

1 Mandeln in einer Pfanne goldbraun rösten

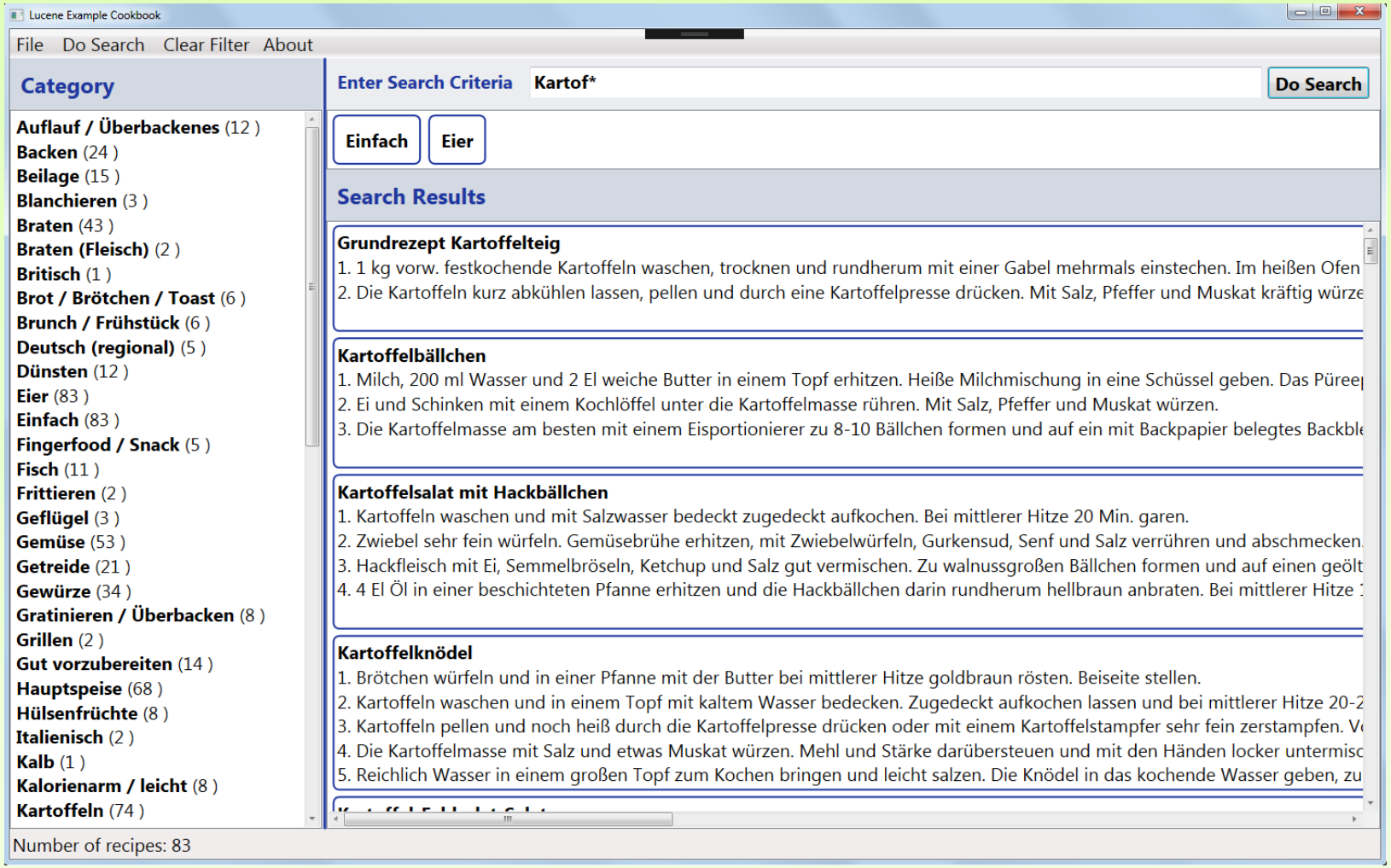
2 Gemüse unter dem heißen Grill goldbraun gratinieren

3 Unter dem vorgeheizten Grill goldbraun überbacken



mandeln	1
pfann	1
goldbraun	1,2,3
rost	1
gemuse	2
heis	2
grill	2,3
gratienier	2
vorgeheizt	3
uberback	3

Beispiel Suche von Kochrezepten



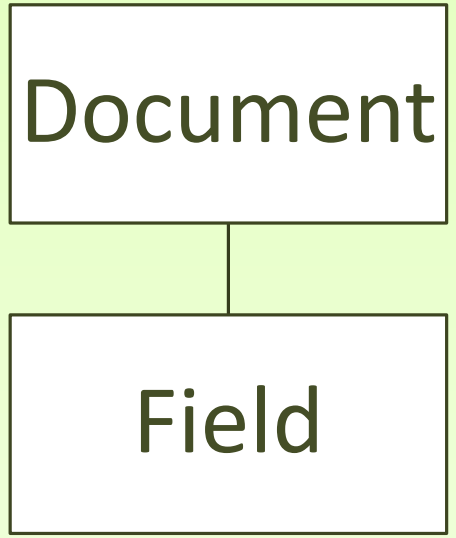
Index erstellen

`IndexWriter`

`Analyzer` (e.g. stopwords)

`Document`

`Field`



Methode CreateIndex

```
private void CreateIndex(cookml cmlData)
{
    var fsDirectory = FSDirectory.Open(indexDirectory);

    using (var writer = new IndexWriter(fsDirectory, GetAnalyzer(), true, IndexWriter.MaxFieldLength.UNLIMITED))
    {
        foreach (var recipe in cmlData.recipe)
        {
            if (recipe.head == null || recipe.head.Length == 0
                || recipe.preparation == null || recipe.preparation.Length == 0)
                continue;
            var document = new Document();

            //Indexing with stemming
            var titleField = new Field("title", recipe.head[0].title, Field.Store.YES, Field.Index.ANALYZED);
            titleField.Boost = 2;
            document.Add(titleField);
            StringBuilder prep = new StringBuilder();
            foreach (var step in recipe.preparation)
            {
                prep.AppendLine(step.text[0]);
            }
            document.Add(new Field("preparation", prep.ToString(), Field.Store.YES, Field.Index.ANALYZED));

            //Indexing without stemming
            document.Add(new Field("_title", recipe.head[0].title, Field.Store.NO, Field.Index.ANALYZED_NO_NORMS));
            document.Add(new Field("_preparation", prep.ToString(), Field.Store.NO, Field.Index.ANALYZED_NO_NORMS));

            document.Add(new Field("rid", recipe.head[0].rid, Field.Store.YES, Field.Index.NOT_ANALYZED));
            //if (recipe.head[0].picbin != null && recipe.head[0].picbin.Length > 0)
            //{
            //    document.Add(new Field("picbin", Convert.ToBase64String(recipe.head[0].picbin[0].Value), Field.Store
            //}
            if (recipe.head[0].cat != null && recipe.head[0].cat.Length > 0)
            {
                foreach (var cat in recipe.head[0].cat)
                {
                    document.Add(new Field("category", cat, Field.Store.NO, Field.Index.NOT_ANALYZED));
                }
            }
            writer.AddDocument(document);
```

Methode GetAnalyzer

```
private static Analyzer GetAnalyzer()
{
    var file = new FileInfo("data/stopwords.txt");
    var stopwords = WordlistLoader.GetWordSet(file, ";");
    return new GermanAnalyzer(Version.LUCENE_30, stopwords);
}
```

Suche ausführen

`QueryParser`

`IndexSearcher`

`ScoreDoc`

`SimpleFacetedSearch`

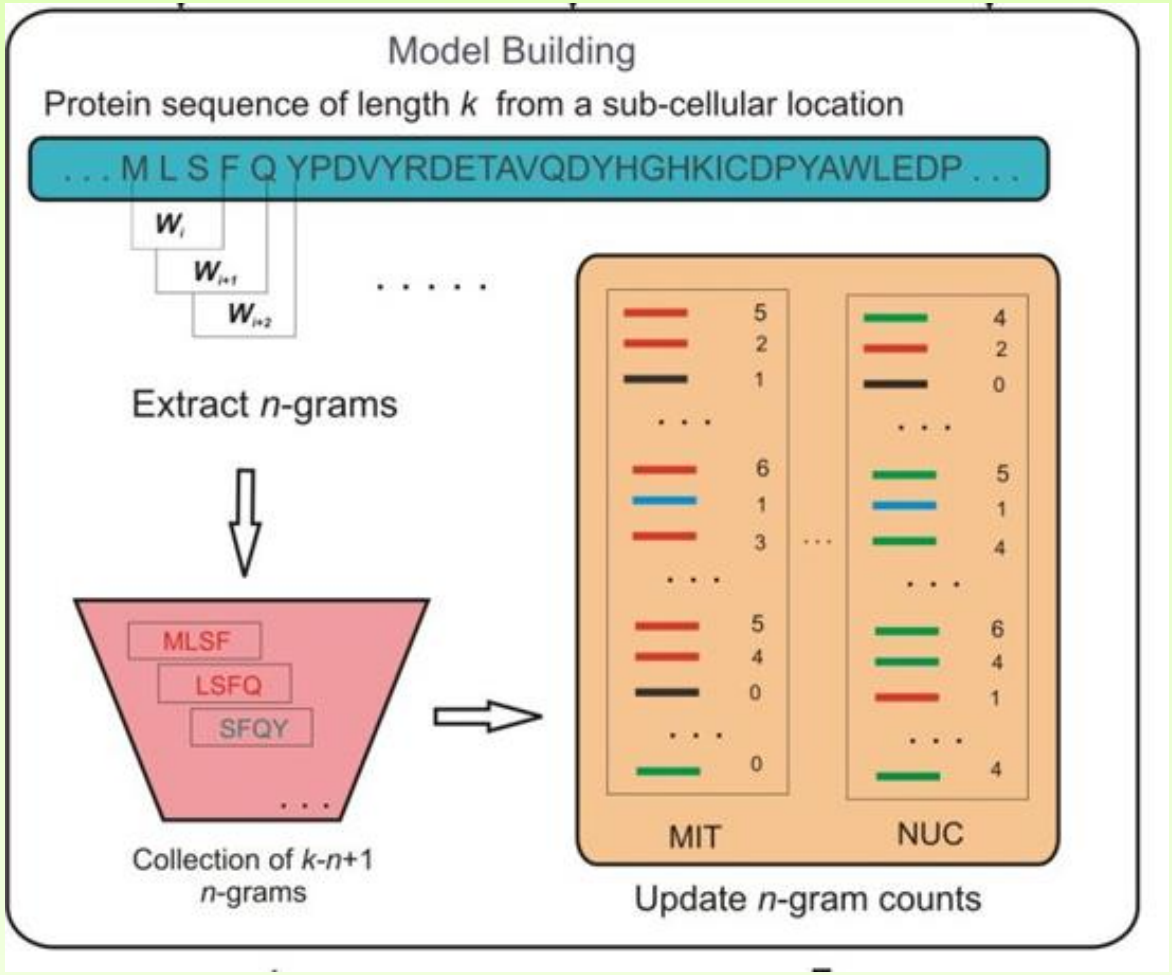
Methode SearchIndex - Query

```
var parser = new MultiFieldQueryParser(
    Version.LUCENE_30,
    new[] { "title", "preparation" },
    GetAnalyzer()
);
Query customQuery = parser.Parse(term.Trim());

var query = new BooleanQuery();
query.Add(new BooleanClause(customQuery, Occur.MUST));

if (FilterCollection.Count > 0)
{
    foreach (var filter in FilterCollection)
    {
        var categoryTerm = new Term("category", filter.Name);
        var categoryFilter = new TermQuery(categoryTerm);
        query.Add(new BooleanClause(categoryFilter, Occur.MUST));
    }
}
IndexSearcher searcher = GetIndexSearcher();
TopDocs result = searcher.Search(query, numberOfResults);
```

Methode SearchIndex - ScoreDoc

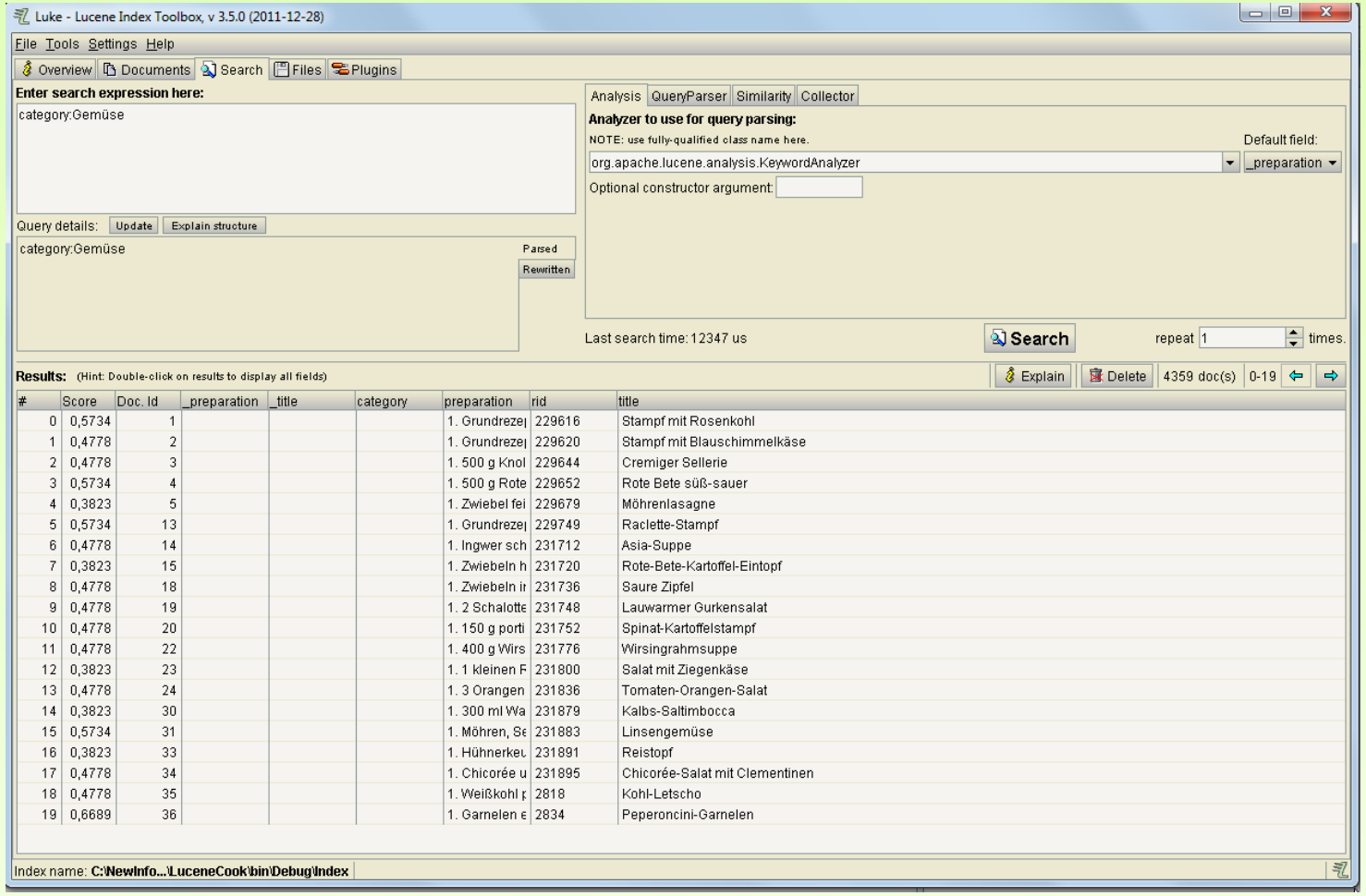
```
OutputFacet(searcher.IndexReader, query, "category", "Category");

ResultCollection.Clear();
NumberOfRecipes = result.TotalHits;
for (var i = 0; i < result.TotalHits; i++)
{
    ScoreDoc scoreDoc = result.ScoreDocs[i];
    var score = scoreDoc.Score;
    var documentIndex = scoreDoc.Doc;
    var document = searcher.Doc(documentIndex);

    ResultCollection.Add(new ResultItem
    {
        Title = document.Get("title"),
        Preparation = document.Get("preparation")
    });
```

Komplexe Objekte indexieren



FragBag, an accurate representation of protein structure, retrieves structural neighbors from the entire PDB quickly and accurately
Inbal Budowski-Tala, Yuval Novb, and Rachel Kolodnya
doi: 10.1073/pnas.0914097107
http://www.pnas.org/content/107/8/3481.abstract

Luke


Luke - Lucene Index Toolbox, v 3.5.0 (2011-12-28)
File Tools Settings Help
Overview Documents Search Files Plugins
Enter search expression here:
category:Gemüse
Query details: Update Explain structure
category:Gemüse
Parsed
Rewritten
Analysis QueryParser Similarity Collector
Analyzer to use for query parsing:
NOTE: use fully-qualified class name here.
Default field:
org.apache.lucene.analysis.KeywordAnalyzer
_preparation
Optional constructor argument:
Last search time: 12347 us
Search
repeat 1 times.
Results: (Hint: Double-click on results to display all fields)
Explain Delete 4359 doc(s) 0-19
Score Doc. Id _preparation _title category preparation rid title
0 0,5734 1 1. Grundrezep 229616 Stampf mit Rosenkohl
1 0,4778 2 1. Grundrezep 229620 Stampf mit Blauschimmelkäse
2 0,4778 3 1. 500 g Knol 229644 Cremiger Sellerie
3 0,5734 4 1. 500 g Rote 229652 Rote Bete süß-sauer
4 0,3823 5 1. Zwiebel fei 229679 Möhrenlasagne
5 0,5734 13 1. Grundrezep 229749 Raclette-Stampf
6 0,4778 14 1. Ingwer sch 231712 Asia-Suppe
7 0,3823 15 1. Zwiebeln h 231720 Rote-Bete-Kartoffel-Eintopf
8 0,4778 18 1. Zwiebeln in 231736 Saure Zipfel
9 0,4778 19 1. 2 Schalotte 231748 Lauwarmer Gurkensalat
10 0,4778 20 1. 150 g porti 231752 Spinat-Kartoffelstampf
11 0,4778 22 1. 400 g Wirs 231776 Wirsingrahmsuppe
12 0,3823 23 1. 1 kleinen F 231800 Salat mit Ziegenkäse
13 0,4778 24 1. 3 Orangen 231836 Tomaten-Orangen-Salat
14 0,3823 30 1. 300 ml Wa 231879 Kalbs-Saltimbocca
15 0,5734 31 1. Möhren, Se 231883 Linsengemüse
16 0,3823 33 1. Hühnerkeu 231891 Reistopf
17 0,4778 34 1. Chicorée u 231895 Chicorée-Salat mit Clementinen
18 0,4778 35 1. Weißkohl p 2818 Kohl-Letscho
19 0,6689 36 1. Garnelen e 2834 Peperoncini-Garnelen
Index name: C:\NewInfo...\LuceneCook\bin\Debug\Index

Suchmaschinen

Elasticsearch

Apache Solr

Open Semantic Search

SEBOL

…

Wer/Wo wird Lucene verwendet

Referenzen/Links

http://lucene.apache.org/pylucene/index.html

http://lucene.apache.org/solr/

https://www.elastic.co/products/elasticsearch

https://www.opensemanticsearch.org/de/

http://db-engines.com/de/ranking/suchmaschine

http://www.dotnetpro.de/update/dotnetpro/wider-fluchen-suchen-1126651.html

Lucene in Action von Erik Hatcher, Otis Gospodnetic, Mike McCandless

Instant Lucene.NET von Michael Heydt

Lucene 4 Cookbook von Edwood Ng, Vineeth Mohan

Fragen ?

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