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

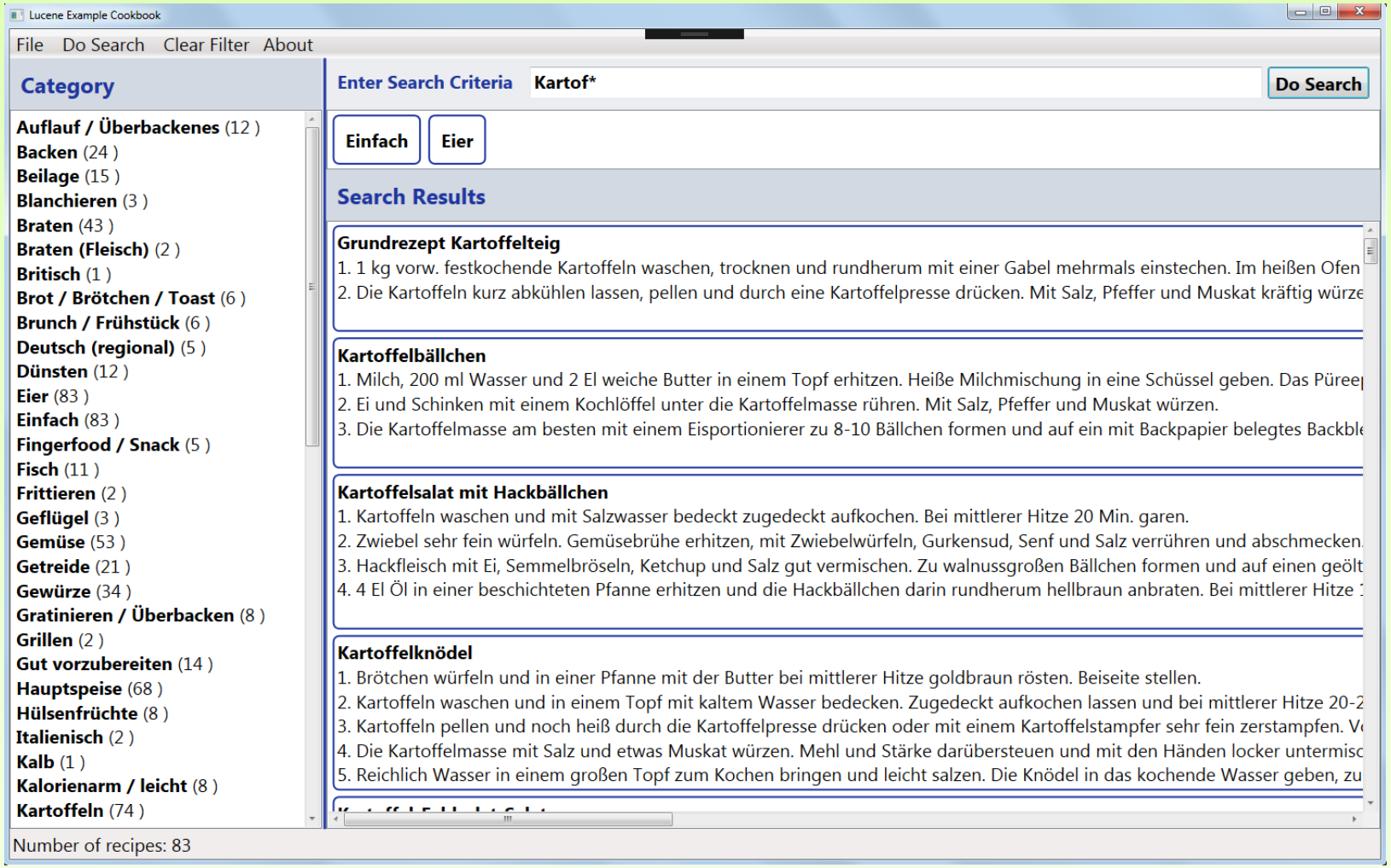
1 Mandeln in einer Pfanne goldbraun rösten

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



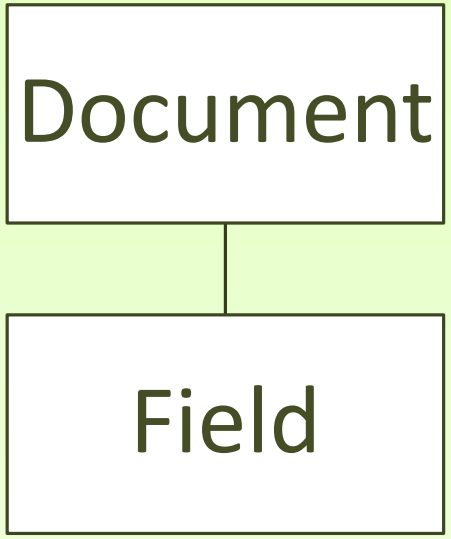
Index erstellen

`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

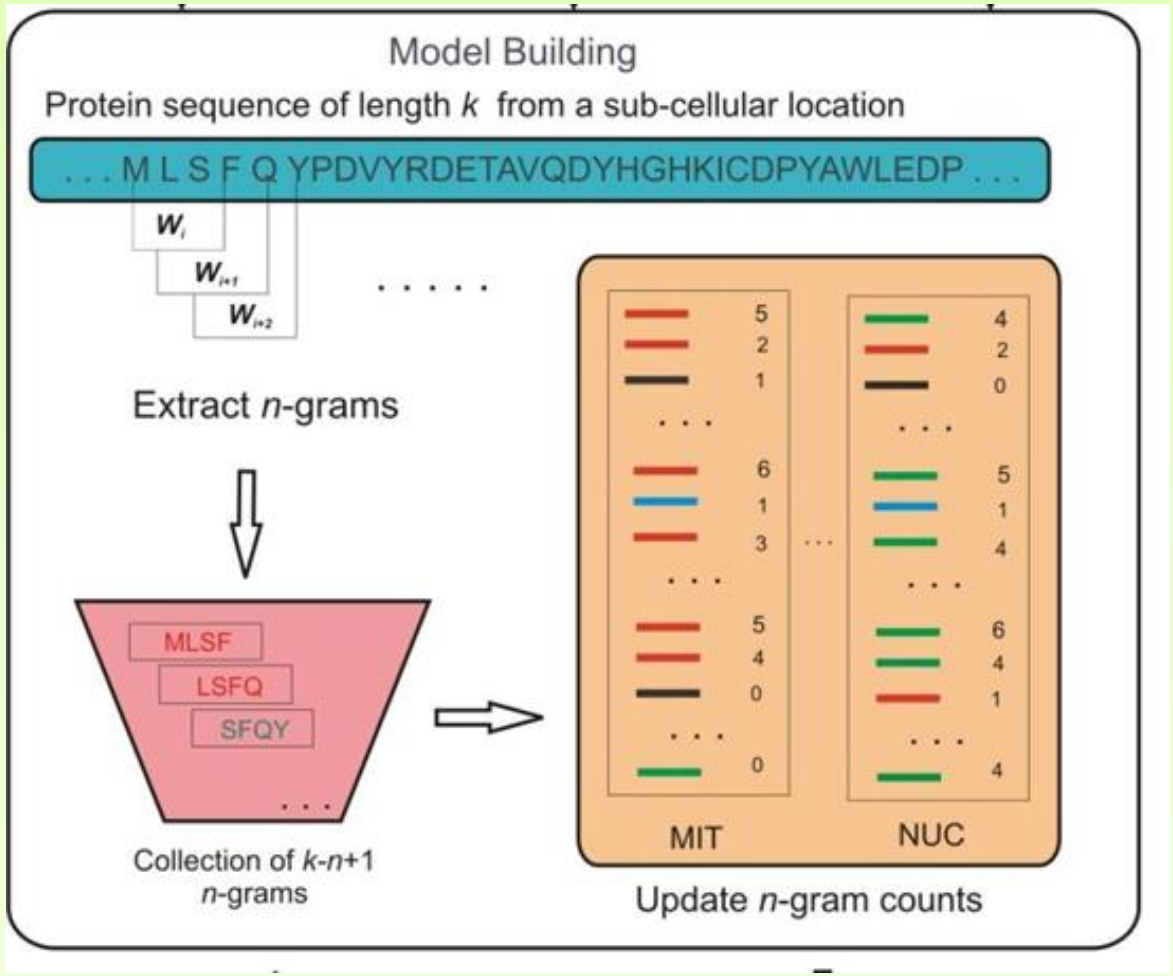
Methode SearchIndex - Query

```
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

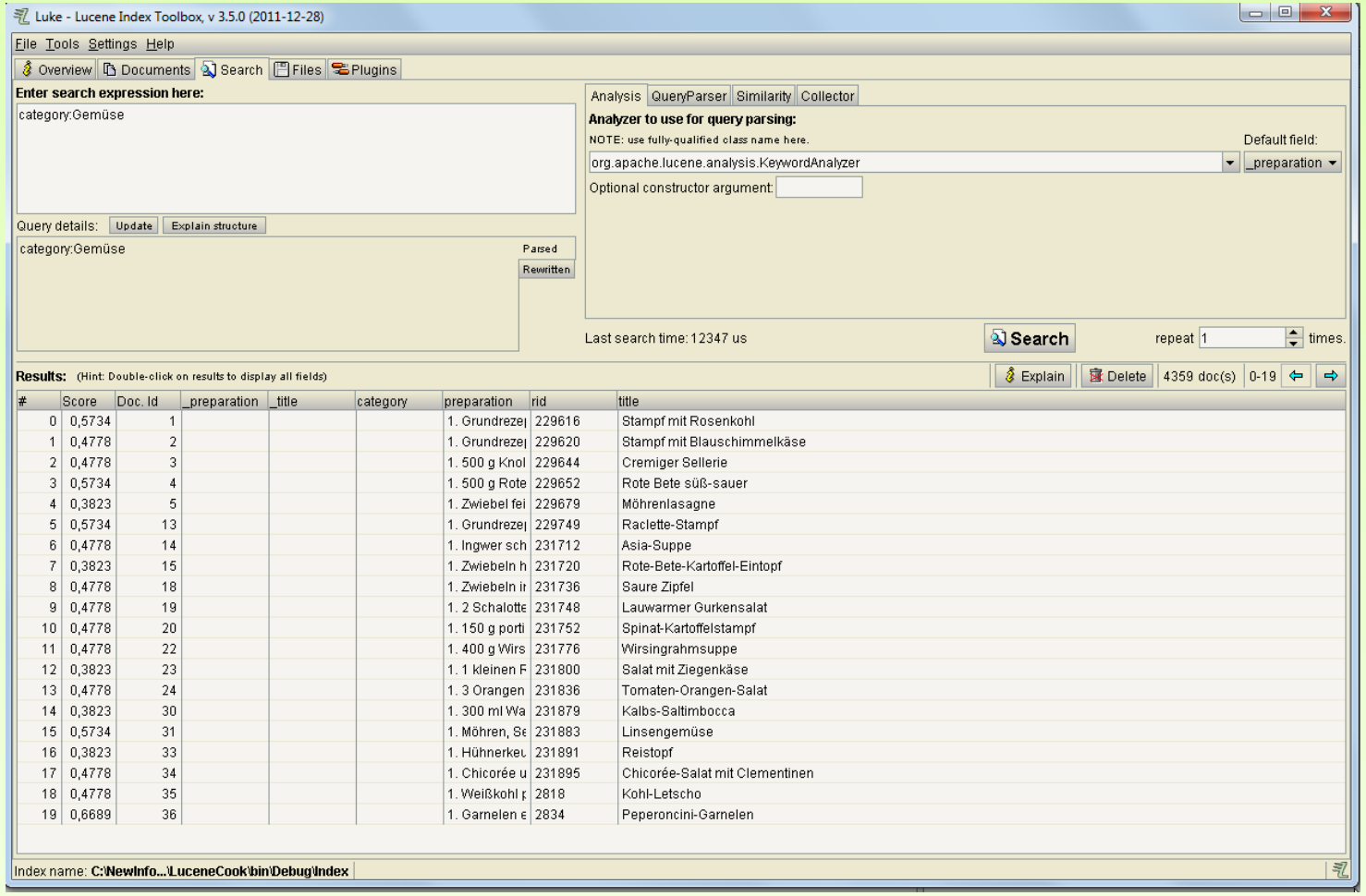
```
OutputFacet(searcher.IndexReader, query, "category", "Category");

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



#	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

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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