annif tutorial

A little bit about algorithms

Two kinds of approaches

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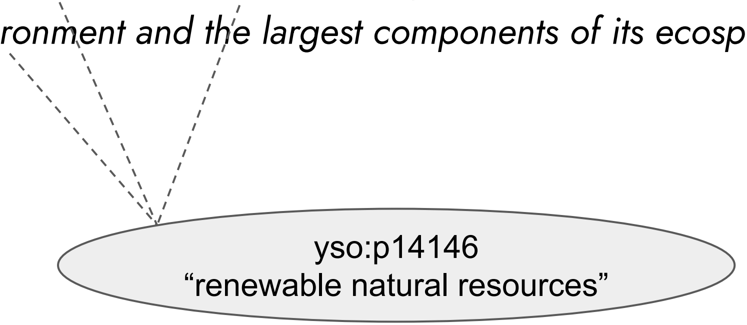
Lexical vs. associative algorithms for subject indexing

Lexical vs. associative algorithms for subject indexing

lexical approaches (e.g.: Maui)

match the **terms** in a document
to terms in a controlled vocabulary

*“**Renewable resources** are a part of Earth's **natural** environment and the largest components of its ecosphere.“*



yso:p14146
“renewable natural resources”

Lexical approaches need comparatively little training data.

Lexical vs. associative algorithms for subject indexing

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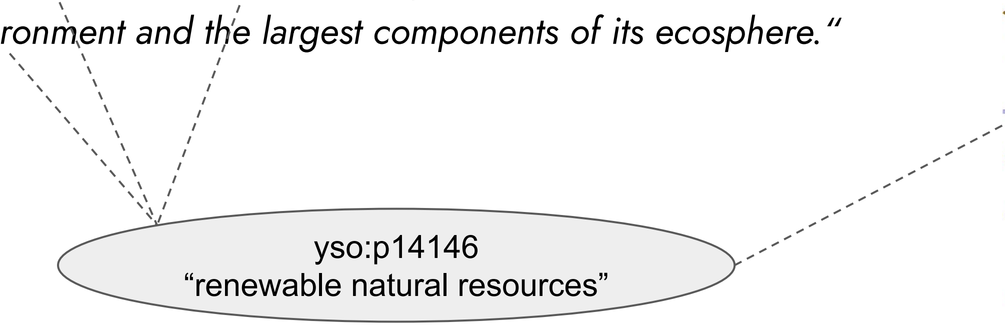


Lexical approaches need comparatively little training data.

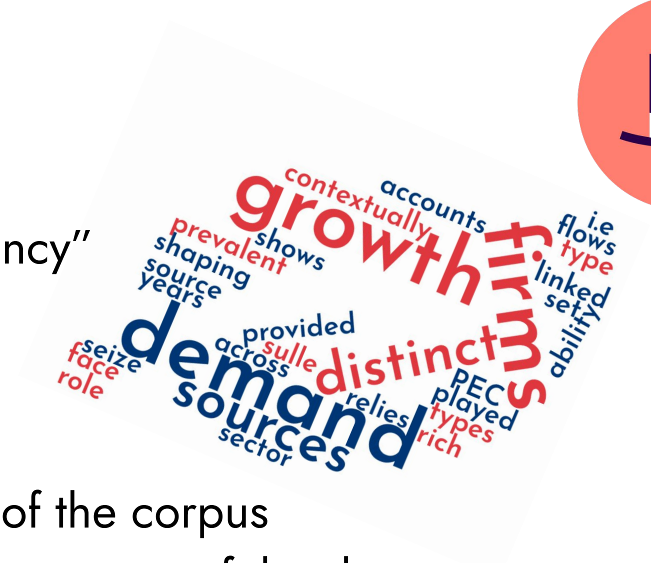
associative approaches (e.g.: TF-IDF, fastText, Omikuji)

learn which **concepts** are correlated with which **terms**
in documents, based on training data

energi
renew
resourc
environment
sustain
technolog
develop
natur
sourc
product
photovolta
assess
manag
report
polici
biomass
solar
system
implement
econom
global
northern
region
design
analysi
power
local
summari
forest
model
finland
practic
pollut
perspect
action
plan
potenti
sector
electr
cell
futur
thermal
impact
biotechnolog
hydrogen
architectur
commun
chang
agricultur
opportun
proceed
research
challeng
approach
chemic
econom
gener
altern
wood
book
russia
ecolog
growth
petroleum
compani
fuel
measur
statist
carbon
water
plant
africa
alberta
base
new
rural
oil
overlap
solut
programm
stock
case
option
union
beyond

Associative approaches need a lot more
training data in order to cover each subject.

TF-IDF



- “term frequency – inverse document frequency” (or TF-IDF) is based on the assumption that a term which does not occur frequently in general (i.e., in the entire corpus) but occurs frequently in a certain document of the corpus could indicate a subject that is relevant to the content of the document

- TF-IDF similarity as a way to compare new documents to known documents is a very simple numerical statistic which can be used to establish a baseline that more advanced machine learning methods have to meet

Algorithms used in Annif

lexical

Maui (using the Maui Server REST API)

Maui is a lexical tool for automated indexing

associative

TF-IDF similarity (implemented with the Gensim Python library)

baseline bag-of-words similarity measure and vector space model

fastText (by Facebook Research)

uses word embeddings and simulates a deep neural network architecture

Parabel and Bonsai (implemented with the Omikuji Python library)

tree-based algorithms for extreme multi-label classification (i.e., when the set of subjects is huge)

Implemented as Annif backends – see the Annif wiki documentation for details about each backend