Bilingual NLP pipeline

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13th July 2017
18:12 h.

Abstract

This is a description and documentation of the installation of the Newsreader-pipeline [1]. It is an instrument to annotate Dutch or English documents with NLP tags. The documents have to be stored in *Newsreader Annotation Format* (NAF [1]).

Contents

1. http://www.newsreader-project.eu/files/2012/12/NWR-D4-2-2.pdf

1 Introduction

This document describes the installation of a pipeline that annotates texts in order to extract knowledge. The pipeline has been set up as part of the newsreader [2] project. It accepts and produces texts in the NAF (Newsreader Annotation Format) format.

Apart from describing the pipeline set-up, the document actually constructs the pipeline. The pipeline has been installed on a (Ubuntu) Linux computer.

The installation has been parameterised. The locations and names that you read (and that will be used to build the pipeline) have been read from variables in file `inst.m4` in the nuweb directory.

The installed pipeline is bi-lingual. It is capable to annotate Dutch and English texts. It recognizes the language from the "lang" attribute of the `NAF` element of the document. Some of the modules are specific for a single language, other modules support both languages. s a result, there must be two pathways to lead a document through the pipeline, one for English and one for Dutch.

The pipeline is a concatenation of independent software modules, each of which reads a NAF document from standard input and produces another NAF document on standard output.

The aim is, to install the pipeline from open-source modules that can e.g. be obtained from Github. However, that aim is only partially fulfilled. Some of the modules still contain elements that are not open-source ot data that are not freely available. Because of lack of time, the current version of the installer installs the English pipeline from a frozen repository of the Newsreader Project.

The NLPP pipeline can be seen as contructed in three parts: 1) The software that is needed to run the pipeline, e.g. compilers and interpreters; 2) the modules themselves and 3) scripts to to make the modules operate on a document.

1.1 Modules of the pipeline

Table 2 lists the modules in the pipeline. The column *source* indicates the origin of the module. The modules are obtained in one of the following ways:

1. If possible, the module is directly obtained from an open-source repository like Github.
2. Some modules have not been officially published in a repository. These modules have been packed in a tar-ball that can be obtained by the author. In table 2 this has been indicated as SNAPSHOT.

The modules themselves use other utilities like dependency-taggers and POS taggers. These utilities are listed in table 1.

Module	Version	Section	Source
KafNafParserPy	1.87	3.6.1	Github
Alpino	21088	4.3	RUG
Ticcutils	0.7	4.3.2	ILK
Timbl	6.4.6	4.3.2	ILK
Treetagger	3.2	4.3.1	Uni. München
Spotlight server	0.7	3.8	Spotlight

Table 1: *List of the utilities to be installed. Column description:* ***directory:*** *Name of the subdirectory below* `mod` *in which it is installed;* ***Source:*** *From where the module has been obtained;* ***script:*** *Script to be included in a pipeline.*

1.2 Reproducibility

An important goal of this pipeline is, to achieve reproducibility. It mean, that at some point in the future the annotation could be re-done on the document and it should produce a result that is

2. http://www.newsreader-project.eu

Module	Source	Resources	Section	Commit	Script	language
Tokenizer	Github	Java	5.1.1	1a69...	`tok`	en/nl
Topic detection	Github	Java	5.1.2	b332...	`topic`	en/nl
Morpho-syntactic parser	Github	Python, Alpino	5.1.3	7cfb...	`mor`	nl
POS-tagger	snapshot		**??**	...	`pos`	en
Named-entity rec/class	Github		5.1.5	b365...	`nerc`	en/nl
Dark-entity relinker	Github		5.1.8	a534...	`nerc`	en/nl
Constituent parser	snapshot		**??**	...	`constpars`	en
Word-sense disamb. nl	Github		5.1.6	6208...	`wsd`	nl
Word-sense disamb. en	snapshot		5.1.14	...	`ewsd`	en
Named entity/DBP	snapshot		5.1.7	...	`ned`	en/nl
NED reranker	snapshot		5.1.11	...	`nedrerscript`	en
Wikify	snapshot		5.1.12	...	`wikify`	en
UKB	snapshot		5.1.13	...	`ukb`	en
Coreference-base	snapshot		**??**	...	`coreference-base`	en
Heideltime	Github		5.1.9	47a4...	`heideltime`	nl
Onto-tagger	Github		5.1.10	3177...	`onto`	nl
Semantic Role labeling nl	Github		5.1.16	0602...	`srl`	nl
Semantic Role labeling en	snapshot		**??**	...	`eSRL`	en
Nominal Event ann.	Github		5.1.10	3177...	`nomevent`	nl
SRL dutch nominals	Github		5.1.16	1c01...	`srl-dutch-nominals`	nl
Framenet-SRL	Github		5.1.10	3177...	`framesrl`	nl
FBK-time	snapshot		**??**	...	`FBK-time`	en
FBK-temprel	snapshot		**??**	...	`FBK-temprel`	en
FBK-causalrel	snapshot		**??**	...	`FBK-causalrel`	en
Opinion-miner	Github		5.1.18	93cd...	`opinimin`	en/nl
Event-coref	Github		5.1.19	24e8...	`evcoref`	en/nl
Factuality tagger	Github		5.1.17	58fa...	`factuality`	en
Factuality tagger	Github		5.1.17	a09d...	`factuality`	nl

Table 2: *List of the modules to be installed. Column description:* ***directory:*** *Name of the subdirectory below subdirectory* `modules` *in which it is installed;* ***source:*** *From where the module has been obtained;* ***commit:*** *Commit-name or version-tag* ***script:*** *Script to be included in a pipeline.*

identical as the result of the original annotation. In our casem reproducibility ivolves the following aspects:

- The annotated document ought to contain documentation about the annotation process: What modules have been applied, what was the version of the software of each module, Which resources have been used and what was the version of the resources.
- The source code of the modules as well as resources like data-sets and programming languages should be available from open repository.
- The repositories of the resources should use some versioning system enabling to re-use the version that has been used originally.

A problem in some cases is, that we need to use utilities that are supplied by external parties, and we do not have control about their methods of publication and version management. Examples of such utilities are the compilers for programming languages like Java, Python and parsers like Alpino.

Therefore, we have the following policy to achieve reproducibility:

- Each of the modules writes in the output NAF its own version, and details about the used resources in sufficient detail to enable re-processing.
- It is assumed that when a programming language (e.g. Java, Python) is used, annotion can be reproducible when the major versions coincide.
- A script is constructed that reproducibly builds an environment for the pipeline on some software/hardware platform (e.g. Linux on X64 CPU), using utilities that have been stored in some non-open repository (to preclude copyright-problems).

2 Structure of the pipeline

The finished pipeline consists of:

- A directory that contains for each module an directory with the module in installed form.
- A script that reads an input naf file or plain text file from standard in and produces an annotated NAF file on standard out.
- A script that must be "sourced" in order to find the resources that the modules need to find.

The directory with the modules must be relocatable and immutable. That means that scripts in modules do not have write permissions on the module directory and that they have to find other files on path-descriptions relative to the current path of the script itself.

2.1 Expected resources

In order to run the modules expect the following:

- Instruction java invokes Java 1.8;
- Instruction python invokes Python 3.6;
- Instruction Perl invokes Perl 5;
- Variable TMPDIR points to a user-writable directory.

3 Construct the infra-structure

In this section we will generate a script that set up an infra-structure in which the pipeline can be exploited. An attempt is made to make as little as possible presumptions about the services that the host provides.

We need to set up the following:

- Java Version 1.8

- Maven (Gradle?)
- Python version 3.6
- Python packages
- Autoconf
- ...

Let us generate a script to do the work:

```
"../env/bin/make_infrastructure" 6a≡
    #!/bin/bash
    ⟨ get location of the script (6b DIR ) 49a ⟩
    cd $DIR
    source ../../progenv
    echo make_infrastructure `date`:
    echo ' '
    ⟨ next part (6c Initialize ) 6p ⟩
    ⟨ init make_infrastructure 7e, ... ⟩
    ⟨ next part (6d Java ) 6p ⟩
    ⟨ set up Java 12a ⟩
    ⟨ next part (6e Maven ) 6p ⟩
    ⟨ set up Maven 13b ⟩
    ⟨ next part (6f Python ) 6p ⟩
    ⟨ set up Python 14b, ... ⟩
    ⟨ next part (6g autoconf ) 6p ⟩
    ⟨ set up autoconf 27d ⟩
    ⟨ next part (6h Perl ) 6p ⟩
    ⟨ install Perl 18g ⟩
    ⟨ next part (6i Shared libs ) 6p ⟩
    ⟨ install shared libs 27f ⟩
    ⟨ next part (6j Alpino ) 6p ⟩
    ⟨ install Alpino 28a ⟩
    ⟨ next part (6k Spotlight ) 6p ⟩
    ⟨ install the Spotlight server 20h, ... ⟩
    ⟨ next part (6l Treetagger ) 6p ⟩
    ⟨ install the treetagger utility 29a, ... ⟩
    ⟨ next part (6m Svmlib ) 6p ⟩
    ⟨ install svmlib 33a ⟩
    ⟨ next part (6n Boost ) 6p ⟩
    ⟨ install boost 33b ⟩

    ◇
```

```
⟨ make scripts executable 6o ⟩ ≡
    chmod 775  ../env/bin/make_infrastructure
    ◇
```

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

```
⟨ next part 6p ⟩ ≡
    echo ' '
    echo make_infrastructure `date`: @1
    echo ' '
    ◇
```

Fragment referenced in 6a.

Let us also make a script that cleans up the infra-structure after the installation.

```
"../env/bin/clean_infrastructure" 7a≡
        #!/bin/bash
        ⟨ get location of the script (7b DIR ) 49a ⟩
        cd $DIR
        source ../../progenv
        ⟨ init make_infrastructure 7e, ... ⟩
        ⟨ clean up after installation 13g ⟩
        ◇
```

```
⟨ make scripts executable 7c ⟩ ≡
        chmod 775  ../env/bin/clean_infrastructure
        ◇
```

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

Before we begin, we can try whether commands that we need to use actually exist and stop execution otherwise.

```
⟨ test presence of command 7d ⟩ ≡
        which @1 >/dev/null
        if
          [ $? -ne 0 ]
        then
          echo "Please install @1"
          exit 4
        fi
        ◇
```

Fragment referenced in 7e.
Uses: install 62a.

```
⟨ init make_infrastructure 7e ⟩ ≡
        ⟨ test presence of command (7f git ) 7d ⟩
        ⟨ test presence of command (7g tar ) 7d ⟩
        ⟨ test presence of command (7h unzip ) 7d ⟩
        ⟨ test presence of command (7i tcsh ) 7d ⟩
        ⟨ test presence of command (7j hg ) 7d ⟩

        ◇
```

Fragment defined by 7e, 10b.
Fragment referenced in 6a, 7a.

3.1 File-structure

Let us set up the pipeline in a directory-structure that looks like figure 1. The directories have the following functions.

socket: The directory in the host where the pipeline is to be implemented.
root: The root of the pipeline directory-structure.
nuweb: This directory contains this document and everything to create the pipeline from the open sources of the modules.
modules: Contains subdirectories with the NLP modules that can be applied in the pipeline.

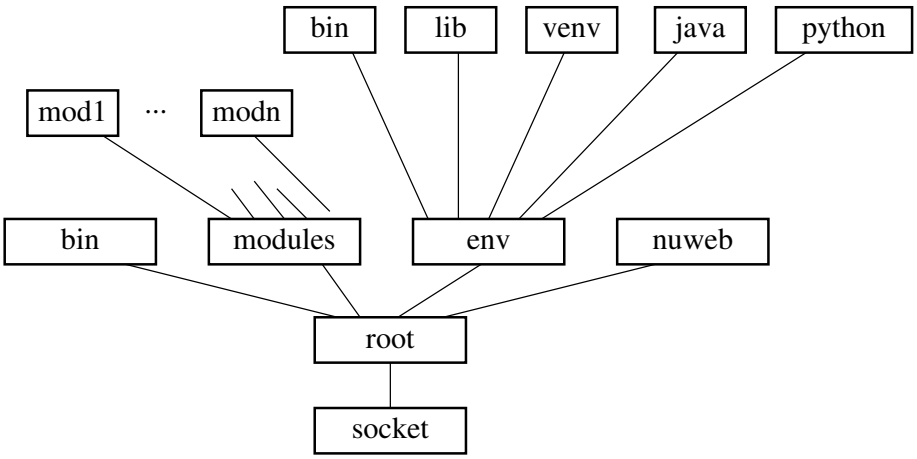

Figure 1: *Directory-structure of the pipeline (see text).*

bin: Contains for each of the applicable modules a script that reads NAF input, passes it to the module in the `modules` directory and produces the output on standard out. Furthermore, the subdirectory contains the script `install_modules` that performs the installation, and a script `test` that shows that the pipeline works in a trivial case.

env: The programming environment. It contains a.o. the Java development kit, Python, the Python virtual environment (`venv`), libraries and binaries.

⟨ *directories to create* 8a ⟩ ≡
```
../modules ◇
```
Fragment defined by 8abcd, 56b.
Fragment referenced in 61b.

⟨ *directories to create* 8b ⟩ ≡
```
../bin ../env/bin ◇
```
Fragment defined by 8abcd, 56b.
Fragment referenced in 61b.

⟨ *directories to create* 8c ⟩ ≡
```
../env/lib ◇
```
Fragment defined by 8abcd, 56b.
Fragment referenced in 61b.

⟨ *directories to create* 8d ⟩ ≡
```
../env/etc ◇
```
Fragment defined by 8abcd, 56b.
Fragment referenced in 61b.

It would be great if an installed pipeline could be moved to another directory while it would keep working. We are not yet sure whether this is possible. However, a minimum condition for this to work would be, that the location of the pipeline can be determined at run-time. To achieve this, let us place a script in the root-directory of the pipeline, that can find in run-time the absolute path to itself and that generates variables that point to the other directories.

"../progenv" 9a≡
```
# Source this script
⟨ get location of the script (9b piperoot ) 49a ⟩
⟨ set variables that point to the directory-structure 9e, ... ⟩
⟨ set environment parameters 9c, ... ⟩
if
  [ -e "$piperoot/progenvv" ]
then
  source $piperoot/progenvv
fi
export progenvset=0
◇
```
Uses: piperoot 9d.

⟨ set environment parameters 9c ⟩ ≡
```
export LC_ALL=en_US.UTF-8
export LANG=en_US.UTF-8
export LANGUAGE=en_US.UTF-8
◇
```
Fragment defined by 9c, 28b, 29b, 32d, 33c.
Fragment referenced in 9a.

The full path to the sourced script can be found in variable BASH_SOURCE[0].

⟨ find the nlpp root directory 9d ⟩ ≡
```
piperoot="$( cd "$( dirname "${BASH_SOURCE[0]}" )" && pwd )"
◇
```
Fragment never referenced.
Defines: piperoot 9abe, 12e, 15ac, 19a, 27de, 32b, 33a, 34b, 48a.

Once we know piperoot, we know the path to the other directories of figure 1.

⟨ set variables that point to the directory-structure 9e ⟩ ≡
```
export pipesocket=${piperoot%%/nlpp}
export nuwebdir=$piperoot/nuweb
export envdir=$piperoot/env
export envbindir=$envdir/bin
export envlibdir=$envdir/lib
export modulesdir=$piperoot/modules
export pipebin=$piperoot/bin
export javadir=$envdir/java
export jarsdir=$javadir/jars
◇
```
Fragment defined by 9ef, 10a, 13f.
Fragment referenced in 9a.
Uses: nuweb 57d, piperoot 9d.

Include a “snapshot” directory that contains non-open materials.

⟨ set variables that point to the directory-structure 9f ⟩ ≡
```
export snapshotdir=$pipesocket/v4.0.0.0_nlpp_resources
◇
```
Fragment defined by 9ef, 10a, 13f.
Fragment referenced in 9a.

Add the environment `bin` directory to `PATH`:

⟨ *set variables that point to the directory-structure* 10a ⟩ ≡
```
export PATH=$envbindir:$pipebin:$PATH
```
◇
Fragment defined by 9ef, 10a, 13f.
Fragment referenced in 9a.
Defines: `PATH` 12e, 13bf, 19a.

3.2 Download resources

To enhance speed of the installation we start to download all resources that we can download at the beginning of the installation in a single blow as parallel processes. We park the resources in a directory `v4.0.0.0_nlpp_resources`, located in the directory where the root of NLPP also resides.

⟨ *init make_infrastructure* 10b ⟩ ≡
```
⟨ download everything 10c, ... ⟩
wait
```
◇
Fragment defined by 7e, 10b.
Fragment referenced in 6a, 7a.

Hopefully there will be little to download.

Synchronize with a non-open snapshot-directory if possible. It is only possible if a valid `ssh` key resides in file `nrkey` in the directory in which the nlpp root directory resides.

⟨ *download everything* 10c ⟩ ≡
```
mkdir -p $pipesocket/v4.0.0.0_nlpp_resources
if
  [ -e /home/huygen/projecten/pipelines/nrkey ]
then
  cd $pipesocket
  ( rsync -e "ssh -i /home/huygen/projecten/pipelines/nrkey" -
rLt newsreader@kyoto.let.vu.nl:v4.0.0.0_nlpp_resources . ) &
fi

```
◇
Fragment defined by 10c, 26.
Fragment referenced in 10b.

Download other stuff using `wget`. The following macro downloads a resource into the snapshot-directory if it is not already there.

⟨ *need to wget* 10d ⟩ ≡
```
if
  [ ! -e $pipesocket/v4.0.0.0_nlpp_resources/@1 ]
then
  cd $pipesocket/v4.0.0.0_nlpp_resources
  ( wget @2 ) &
fi
```
◇
Fragment referenced in 12f, 17b, 20a, 27a.

3.3 Java

We need to have a Java JDK version 1.8 installed. In other words, when we issue the instruction `javac -version` within the pipeline environment, the response must be something like `javac 1.8.0_131`. We assume that if we find a correct Java 1.8, there will also be a proper `java`. Let us first test whether that is the case. If it is not the case, we can install java if a proper tarball is present in the "snaphot directory".

Let us perform the two tests:

Do we have a proper Java?

⟨ *check presence of javac in 1.8* 11a ⟩ ≡

```
javac -version 2>&1 | grep 1.8 >/dev/null
if
  [ $? == 0 ]
then
  @1="True"
else
  @1="False"
fi
◇
```

Fragment referenced in 12a.

Do we have a tarball to install Java? (in fact, the following macro can be used to check the presence of any tarball in the snapshot directory).

⟨ *check whether a tarball is present in the snapshot* 11b ⟩ ≡

```
if
  [ -e $pipesocket/v4.0.0.0_nlpp_resources/@1 ]
then
  @2="True"
else
  @2="False"
fi
◇
```

Fragment referenced in 12a, 13b, 14b, 18a.

Now do it:

⟨ *set up Java* 12a ⟩ ≡

```
⟨ check presence of javac in 1.8 (12b java_OK ) 11a ⟩
if
  [ ! "$java_OK" == "True" ]
then
  ⟨ check whether a tarball is present in the snapshot (12c jdk-8u131-linux-x64.tar.gz,12d tarball_present ) 11b ⟩
  if
    [ ! "$tarball_present" == "True" ]
  then
    echo "Please install Java 1.8 JDK"
    exit 4
  fi
  mkdir -p $javadir
  cd $javadir
  tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/jdk-8u131-linux-x64.tar.gz
  ⟨ set up java environment 12e ⟩
fi
◇
```

Fragment referenced in 6a.

Adapt the `PATH` variable and set `JAVA_HOME`. Set these variables in the script that will be sourced in the running pipeline and set them in this script because we are going to need Java.

⟨ *set up java environment* 12e ⟩ ≡

```
echo 'export JAVA_HOME=$envdir/java/jdk1.8.0_131' >> $piperoot/progenvv
echo 'export PATH=$JAVA_HOME/bin:$PATH' >> $piperoot/progenvv
export JAVA_HOME=$envdir/java/jdk1.8.0_131
export PATH=$JAVA_HOME/bin:$PATH
◇
```

Fragment referenced in 12a.
Uses: `PATH` 10a, `piperoot` 9d.

3.4 Maven

Currently we need version `3.0.5` to compile the Java sources in some of the modules.

3.5 Maven

Some Java-based modules can best be compiled with Maven. So download and install Maven:

⟨ *download stuff* 12f ⟩ ≡

```
⟨ need to wget (12g apache-maven-3.0.5-bin.tar.gz,12h http://apache.rediris.es/maven/maven-3/3.0.5/binarie
◇
```

Fragment defined by 12f, 17b, 20a, 27a.
Fragment referenced in 26.

First check whether maven is already present in the correct version.

⟨ *check presence of maven in 3.0.5* 13a ⟩ ≡

```
mvn -version | grep "Maven 3.0.5" >/dev/null
if
  [ $? == 0 ]
then
  @1="True"
else
  @1="False"
fi
```

◇

Fragment referenced in 13b.

⟨ *set up Maven* 13b ⟩ ≡

```
⟨ check presence of maven in 3.0.5 (13c mvn_OK ) 13a ⟩
if
  [ ! "$mvn_OK" == "True" ]
then
  ⟨ check whether a tarball is present in the snapshot (13d apache-maven-3.0.5-bin.tar.gz,13e tarball_present ) 1
  if
    [ ! "$tarball_present" == "True" ]
  then
    echo "Please install Maven version 3.0.5"
    exit 4
  fi
  cd $envdir
  tar -xzf /home/huygen/projecten/pipelines/v4.0.0.0_nlpp_resources/apache-maven-
3.0.5-bin.tar.gz
  export MAVEN_HOME=$envdir/apache-maven-3.0.5
  export PATH=${MAVEN_HOME}/bin:${PATH}
fi
```

◇

Fragment referenced in 6a.

⟨ *set variables that point to the directory-structure* 13f ⟩ ≡

```
export MAVEN_HOME=$envdir/apache-maven-3.0.5
export PATH=${MAVEN_HOME}/bin:${PATH}

```

◇

Fragment defined by 9ef, 10a, 13f.
Fragment referenced in 9a.
Uses: PATH 10a.

When the installation has been finished, we do not need maven anymore.

⟨ *clean up after installation* 13g ⟩ ≡

```
cd $envdir
rm -rf apache-maven-3.0.5
```

◇

Fragment referenced in 7a.

3.6 Python

Several modules in the pipeline run on Python version 3.6. If the command `python` does not invoke that version, we can try install ActivePython, of which we have a tarball in the snapshot. Versioning in Python is very confusing. It is the official Python policy that `/usr/bin/env python` points to Python version 2 but that scripts with a shabang of `#<!!>! /usr/bin/env python` should be executable by Python version 2 as well as Python version 3.

Our policy will be as follows:

1. When installing, make sure that command `python3` starts a python 3.6 executable. If this is not the case, install ActivePython version 3.6. 2. Generate a virtual environment. 3. Make sure that in our environmen command `python` executes python from the virtual environment.

⟨ *check presence of python3 in 3.6* 14a ⟩ ≡

```
python3 --version 2>&1 | grep "Python 3.6" >/dev/null
if
  [ $? == 0 ]
then
  @1="True"
else
  @1="False"
fi
◇
```

Fragment referenced in 14b.

⟨ *set up Python* 14b ⟩ ≡

```
⟨ check presence of python3 in 3.6 (14c python_OK ) 14a ⟩
if
  [ ! "$python_OK" == "True" ]
then
  ⟨ check whether a tarball is present in the snapshot (14d ActivePython-3.6.0.3600-linux-x86_64-glibc-2.3.6-40
  if
    [ ! "$tarball_present" == "True" ]
  then
    echo "Please install Python version 3.6"
    exit 4
  fi
  ⟨ install ActivePython 15a ⟩
fi
◇
```

Fragment defined by 14b, 17a.
Fragment referenced in 6a.

Unpack the tarball in a temporary directory and install active python in the `env` subdirectory of nlpp. Activepython has a few peculiarities:

- It installs things in subdirectories `bin` and `lib` of the installation-directory (in our case subdirectory `env`).
- It installs scripts with names `python3` and `pip3`. We will make symbolic links from these scripts to `python` resp. `pip`.
- It writes self-starting scripts with a “shabang” containing the full absolute path to the `python3` script. In an attempt to make Active-python relocatable we will rewrite the Shabangs to have them contain `#!/usr/bin/env python`.

⟨ *install ActivePython* 15a ⟩ ≡
```
pytinsdir=‘mktemp -d -t activepyt.XXXXXX‘
cd $pytinsdir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/ActivePython-3.6.0.3600-linux-x86_64-
glibc-2.3.6-401834.tar.gz
acdir=‘ls -1‘
cd $acdir
./install.sh -I $envdir
cd $piperoot
rm -rf $pytinsdir
⟨ create python script and pip script 15b ⟩
⟨ rewrite ActivePython shabangs 15c ⟩

◇
```
Fragment referenced in 14b.
Uses: `install` 62a, `piperoot` 9d.

⟨ *create python script and pip script* 15b ⟩ ≡
```
cd $envbindir
rm python
ln -s python3 python
rm pip
ln -s pip3 pip
◇
```
Fragment referenced in 15a.

To rewrite the shabangs of the ActivePython scripts do as follows:

1. Create a temporary directory.
2. Generate an AWK script that replaces the shabang line with a correct one.
3. Generate a script that moves a script from `env/bin` to the temporary directory and then applies the AWK script.
4. Apply the generated script on the scripts in `env/bin`.

⟨ *rewrite ActivePython shabangs* 15c ⟩ ≡
```
transfile=‘mktemp -t trans.XXXXXX‘
rm -rf $transfile
⟨ apply script tran on the scripts in (15d $envbindir,15e $transfile ) 16c ⟩
cd $piperoot
rm -rf $transfile
◇
```
Fragment referenced in 15a.

"../env/bin/tran" 15f≡
```
#!/bin/bash
⟨ get location of the script (15g trandir ) 49a ⟩
workfil=$1
tempfil=$2
mv $workfil $tempfil
gawk -f $trandir/chasbang.awk $tempfil>$workfil
chmod 775 $workfil
◇
```

⟨ *make scripts executable* 16a ⟩ ≡
```
chmod 775  ../env/bin/tran
```
◇

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

"../env/bin/chasbang.awk" 16b≡
```
#!/usr/bin/gawk -f
BEGIN { shabang="#!/usr/bin/env python3"}

/^\#\!.*python.*/ { print shabang
                    next
                  }
{print}
```
◇

Uses: print 55b.

The following looks complicated. The `find` command applies the `file` command on the files in the `env/bin` directory. The grep command filters out the names of the files that are scripts. it produces a filename, followed by a colon, followed by a description of the type of the file. The `gawk` command prints the filenames only and the `xargs` command applies the `tran` script on the file.

⟨ *apply script tran on the scripts in* 16c ⟩ ≡
```
find @1 -type f -exec file {} + \
   |  grep "Python script" | gawk '{print $1}' FS=':' \
   | xargs -iaap $envbindir/tran aap @2
```
◇

Fragment referenced in 15c.
Uses: print 55b.

3.6.1 Python packages

In order to be reproducible, we must make sure that Python packages are installed in the correct version. Therefore, we will install the packages beforehand and do not leave that to the install-scripts of the modules. Descriptions of the packages can be found on https://pypi.python.org. Install the following packages:

package	**version**	**module**
KafNafParserPy	1.87	
lxml	3.8.0	
pyyaml	3.12	
requests	2.18.1	networkx
networkx	1.11	corefbase

⟨ *set up Python* 17a ⟩ ≡

```
pip install KafNafParserPy==1.87
pip install lxml==3.8.0
pip install networkx==1.11
pip install pyyaml==3.12
pip install requests==2.18.1
pip install six==1.10.0.
◇
```

Fragment defined by 14b, 17a.
Fragment referenced in 6a.
Uses: `install` 62a.

3.7 Perl

One of the modules uses perl and needs `XML::LibXML`. However, installation of that package seems to be tricky and seems to depend on the availability of obscure stuff. So, we proceed as follows. First test whether Perl version 5 is present on the host. If that is not the case, check whether we have a tarball named `20160520_nlpp_perllib.tgz` in the snapshot. If that is the case, install Perl from scratch and unpack the tarball. Otherwise, fail, and tell the user to install Perl and `XML::LibXML`.

Install Perl locally, to be certain that Perl is available and to enable to install packages that we need (in any case: `XML::LibXML`).

⟨ *download stuff* 17b ⟩ ≡

⟨ *need to wget* (17c `perl-5.22.1.tar.gz`,17d `http://www.cpan.org/src/5.0/perl-5.22.1.tar.gz`) 10d ⟩

◇

Fragment defined by 12f, 17b, 20a, 27a.
Fragment referenced in 26.

⟨ *check presence of perl in 5* 17e ⟩ ≡

```
perl -v 2>&1 | grep "perl 5," >/dev/null
if
  [ $? == 0 ]
then
  @1="True"
else
  @1="False"
fi
◇
```

Fragment referenced in 18a.

⟨ *set up Perl* 18a ⟩ ≡

```
⟨ check presence of perl in 5 (18b perl_OK ) 17e ⟩
if
  [ "$perl_OK" == "True" ]
then
  ⟨ check whether XML::LibXML is installed (18c lib_OK ) 18f ⟩
  if
    [ ! "$lib_OK" == "True" ]
  then
     perl_OK="False"
  fi
fi
if
  [ ! "$perl_OK" == "True" ]
then
  ⟨ check whether a tarball is present in the snapshot (18d 20160520_nlpp_perllib.tgz,18e tarball_present ) 11b ⟩
  if
    [ ! "$tarball_present" == "True" ]
  then
    echo "Please install Perl version 3.6 and XML::LXML"
    exit 4
  fi
  ⟨ install perl 19a, ... ⟩
fi

◇
```

Fragment never referenced.

⟨ *check whether XML::LibXML is installed* 18f ⟩ ≡

```
perl -MXML::LibXML -e 1 2>/dev/null
if
  [ $? == 0 ]
then
  @1="True"
else
  @1="False"
fi
◇
```

Fragment referenced in 18a.

⟨ *install Perl* 18g ⟩ ≡

```
tempdir=‘mktemp -d -t perl.XXXXXX‘
cd $tempdir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/perl-5.22.1.tar.gz
cd perl-5.22.1
./Configure -des -Dprefix=$envdir/perl
make
make test
make install
cd $progroot
rm -rf $tempdir

◇
```

Fragment referenced in 6a.
Uses: install 62a.

Make sure that modules use the correct Perl

⟨ *install perl* 19a ⟩ ≡
```
echo 'export PERL_HOME=$envdir/perl' >> $piperoot/progenvv
echo 'export PATH=$PERL_HOME/bin:$PATH' >> $piperoot/progenvv
export PERL_HOME=$envdir/perl
export PATH=$PERL_HOME/bin:$PATH
◇
```
Fragment defined by 19ab.
Fragment referenced in 18a.
Uses: PATH 10a, piperoot 9d.

Unpack the poor-man tarball with LibXML:

⟨ *install perl* 19b ⟩ ≡
```
cd $envdir/perl/lib
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/20160520_nlpp_perllib.tgz
◇
```
Fragment defined by 19ab.
Fragment referenced in 18a.

3.8 Spotlight

A Spotlight server occupies a lot of memory and we need two of them, one for each language. We may be lucky and have a spotlight server running somewhere. Nevertheless, let us be prepared to be able to install a server ourselves.

3.8.1 Install spotlight servers

Install Spotlight in the way that Itziar Aldabe (mailto:itziar.aldabe@ehu.es) described:

The NED module works for English, Spanish, Dutch and Italian. The module returns multiple candidates and correspondences for all the languages. If you want to integrate it in your Dutch or Italian pipeline, you will need:

1. The jar file with the dbpedia-spotlight server. You need the version that Aitor developed in order to correctly use the "candidates" option. You can copy it from the English VM. The jar file name is `dbpedia-spotlight-0.7-jar-with-dependencies-candidates.jar`
2. The Dutch/Italian model for the dbpedia-spotlight. You can download them from: http://spotlight.sztaki.hu/downloads/
3. The jar file with the NED module: `ixa-pipe-ned-1.0.jar`. You can copy it from the English VM too.
4. The file: `wikipedia-db.v1.tar.gz`. You can download it from: http://ixa2.si.ehu.es/ixa-pipes/models/wikipedia-db.v1.tar.gz. This file contains the required information to do the mappings between the wikipedia-entries. The zip file contains three files: wikipedia-db, wikipedia-db.p and wikipedia-db.t

To start the dbpedia server: Italian server:

```
java -jar -Xmx8g dbpedia-spotlight-0.7-jar-with-dependencies-candidates.jar \
    it http://localhost:2050/rest
```

Dutch server:

```
java -jar -Xmx8g dbpedia-spotlight-0.7-jar-with-dependencies-candidates.jar nl http://localhost:2
```

We set 8Gb for the English server, but the Italian and Dutch Spotlight will require less memory.

So, let us do that.

First, get the Spotlight model data that we need:

⟨ *download stuff* 20a ⟩ ≡

```
⟨ need to wget (20b nl.tar.gz,20c http://spotlight.sztaki.hu/downloads/archive/2014/nl.tar.gz ) 10d ⟩
⟨ need to wget (20d en_2+2.tar.gz,20e http://spotlight.sztaki.hu/downloads/archive/2014/en_2+2.tar.gz ) 10d
⟨ need to wget (20f wikipedia-db.v1.tar.gz,20g http://ixa2.si.ehu.es/ixa-pipes/models/wikipedia-db.v1.tar.g

◇
```

Fragment defined by 12f, 17b, 20a, 27a.
Fragment referenced in 26.

⟨ *install the Spotlight server* 20h ⟩ ≡

```
cd $envdir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/spotlightnl.tgz
cd $envdir/spotlight
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/nl.tar.gz
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/en_2+2.tar.gz
◇
```

Fragment defined by 20hj.
Fragment referenced in 6a.

⟨ *get spotlight model ball* 20i ⟩ ≡

```
if
  [ -e $pipesocket/v4.0.0.0_nlpp_resources/@1 ]
then
  tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/@1
else
  wget http://spotlight.sztaki.hu/downloads/archive/2014/@1
  tar -xzf @1
  rm @1
fi

◇
```

Fragment never referenced.

We choose to put the Wikipedia database in the spotlight directory.

⟨ *install the Spotlight server* 20j ⟩ ≡

```
cd $envdir/spotlight
tar -xzf $pipesocket/$snapshotdirectory/wikipedia-db.v1.tar.gz
◇
```

Fragment defined by 20hj.
Fragment referenced in 6a.

3.8.2 Check/start the Spotlight server

The macro `check/start spotlight` does the following:

1. Check whether spotlight runs on the default spotlighthost.

2. If that is not the case, and the defaulthost is not `localhost`, check whether Spotlight runs on localhost.
3. If a running spotlightserver is still not found, start a spotlightserver on localhost.

Start Spotlight, if it doesn't run already. Spotlight ought to run on localhost unless variable `spotlighthost` exists. In that case, check whether a Spotlight server can be contacted on that host. Otherwise, change `spotlighthost` to `localhost` and check whether a Spotlight server runs there. If that is not the case, start up a Spotlight server on localhost.

The following script, `check_start_spotlight`, has three optional arguments:

language: Default is exported variable `naflang` if it exists, or `en`.
spotlighthost: Name of a host that probably runs a Spotlightserver. Default: exported variable `spotlighthost` if it exists, or `localhost`.
spotlightport: Default: exported variable `spotlightport` if it exists or either 2020 or 2060 for English resp. Dutch.

`"../bin/check_start_spotlight"` 21a≡

```
#!/bin/bash
⟨ get location of the script (21b DIR ) 49a ⟩
cd $DIR
source ../progenv
⟨ get commandline-arguments for check_start_spotlight 21c ⟩
⟨ set default arguments for Spotlight 22a ⟩
◇
```

File defined by 21a, 22b.

The code to obtain command-line arguments has been obtained from Stackoverflow. The following fragment reads the arguments `-l language`, `-h spotlighthost` and `-p spotlightport`:

⟨ get commandline-arguments for check_start_spotlight 21c ⟩ ≡

```
while [[ $# > 1 ]]
do
  key="$1"

  case $key in
    -l|--language)
      naflang="$2"
      shift # past argument
    ;;
    -h|--spothost)
      spotlighthost="$2"
      shift # past argument
    ;;
    -p|--spotport)
    spotlightport="$2"
    shift # past argument
    ;;
    *)
            # unknown option
    ;;
  esac
  shift # past argument or value
done
◇
```

Fragment referenced in 21a.
Uses: `naflang` 46b.

Fill in default values when they cannot be found in exported variables nor in command-line arguments.

⟨ *set default arguments for Spotlight* 22a ⟩ ≡

```
if
  [ "$spotlighthost" == "" ]
then
  spotlighthost=130.37.53.33
fi
if
  [ "$spotlightport" == "" ]
then
  if
    [ "$naflang" == "nl" ]
  then
      spotlightport=2060
  else
      spotlightport=2020
  fi
fi
◇
```

Fragment referenced in 21a.
Uses: naflang 46b.

"../bin/check_start_spotlight" 22b≡

```
⟨ check listener on host, port (22c $spotlighthost,22d $spotlightport ) 23c ⟩
if
  [ $spotlightrunning -ne 0 ]
then
  if
    [ ! "$spotlighthost" == "localhost" ]
  then
    export spotlighthost="localhost"
    ⟨ check listener on host, port (22e $spotlighthost,22f $spotlightport ) 23c ⟩
  fi
fi
if
  [ $spotlightrunning -ne 0 ]
then
  ⟨ start the Spotlight server on localhost 25a, ... ⟩
fi
echo $spotlighthost:$spotlightport
◇
```

File defined by 21a, 22b.

⟨ *make scripts executable* 22g ⟩ ≡

```
chmod 775  ../bin/check_start_spotlight
◇
```

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

Use function `check_start_spotlight` to find and exploit a running Spotlight-server or to die (with exit code 5) if no server can be found or created. The macro uses implicitly the exported variables `spotlighthost` and `spotlightport` if they exist.

⟨ *find a spotlightserver or exit* 23a ⟩ ≡

```
spothostport=‘/home/huygen/projecten/pipelines/nlpp/bin/check_start_spotlight -
l $naflang‘
export spotlighthost=‘echo $spothostport | gawk -F ":" ’{print $1}’‘
export spotlightport=‘echo $spothostport | gawk -F":" ’{print $2}’‘
echo "Spotlight server found on $spothostport." >&2
if
  [ "$spotlighthost" == "none" ]
then
  echo "No Spotlight-server found."
  exit 5
fi
◇
```

Fragment referenced in 48a.
Uses: `naflang` 46b, `print` 55b.

Set the port-number and the language resource for Spotlight, dependent of the language that the user gave as argument.

⟨ *get spotlight language parameters* 23b ⟩ ≡

```
if
  [ "$naflang" == "nl" ]
then
   spotlightport=2060
else
  spotlightport=2020
fi
◇
```

Fragment never referenced.
Uses: `naflang` 46b.

The following macro has a hostname and a port-number as arguments. It checks whether something in the host listens on the port and sets variable `success` accordingly:

⟨ *check listener on host, port* 23c ⟩ ≡

```
exec 6<>/dev/tcp/@1/@2 2>/dev/null
spotlightrunning=$?
exec 6<&-
exec 6>&-
◇
```

Fragment referenced in 22b, 25c.

If variable `spotlighthost` does not exist, set it to localhost. Test whether a Spotlightserver runs on `spotlighthost`. If that fails and `spotlighthost` did not point to localhost, try localhost.

If the previous attempts were not succesfull, start the spotlightserver on localhost.

If some spotlightserver has been contacted, set variable `spotlightrunning`. Otherwise exit. At the end variable `spotlighthost` ought to contain the address of the Spotlight-host.

⟨ *try to obtain a running spotlightserver* 24a ⟩ ≡

```
⟨ test whether spotlighthost runs (24b $spotlighthost ) 24e ⟩
if
  [ ! $spotlightrunning ]
then
  if
    [ "$spotlighthost" != "localhost" ]
  then
    export spotlighthost=localhost
    ⟨ test whether spotlighthost runs (24c $spotlighthost ) 24e ⟩
  fi
fi
if
  [ ! $spotlightrunning ]
then
  ⟨ start the Spotlight server on localhost 25a, ... ⟩
  ⟨ test whether spotlighthost runs (24d $spotlighthost ) 24e ⟩
fi
if
  [ ! $spotlightrunning ]
then
  echo "Cannot start spotlight"
  exit 4
fi
◇
```

Fragment never referenced.

Test whether the Spotlightserver runs on a given host. The “spotlight-test” does not really test Spotlight, but it tests whether something is listening on the port and host where we expect Spotlight. I found the test-construction that is used here on Stackoverflow. If the test is positive, set variable `spotlightrunning` to 0. Otherwise, unset that variable.

⟨ *test whether spotlighthost runs* 24e ⟩ ≡

```
exec 6<>/dev/tcp/@1/2060
if
  [ $? -eq 0 ]
then
  export spotlightrunning=0
else
  spotlightrunning=
fi
exec 6<&-
exec 6>&-
◇
```

Fragment referenced in 24a.

When trying to start the Spotlight-server on localhost, take care that only one process does this. So we do this:

1. Try to acquire a lock without waiting for it.
2. If we got the lock, run the Spotlight java program in background.
3. If we got the lock, release it.
4. If we did not get the lock, wait for the lock to be released by the process that started the spotlight-server.

But first, we specify the resources for the Spotlight-server.

⟨ *start the Spotlight server on localhost* 25a ⟩ ≡

```
if
  [ "$naflang" == "nl" ]
then
  spotresource="nl"
else
  spotresource="en_2+2"
fi
spotlightjar=dbpedia-spotlight-0.7-jar-with-dependencies-candidates.jar
◇
```

Fragment defined by 25ab.
Fragment referenced in 22b, 24a.
Uses: `naflang` 46b.

⟨ *start the Spotlight server on localhost* 25b ⟩ ≡

```
local oldd=‘pwd‘
cd /home/huygen/projecten/pipelines/nlpp/env/spotlight
$envbindir/sematree acquire spotlock 0
gotit=$?
if
  [ $gotit == 0 ]
then
  java -jar -Xmx8g $spotlightjar $spotresource \
       http://localhost:$spotlightport/rest  &
  ⟨ wait until the spotlight server is up or faulty 25c ⟩
  $envbindir/sematree release spotlock
else
  ⟨ wait until the spotlight server is up or faulty 25c ⟩
fi
cd $oldd
◇
```

Fragment defined by 25ab.
Fragment referenced in 22b, 24a.

When the Sportlight server has been started, it takes op to a minute until it really listens on its port. When there is something wrong, it will never listen, of course. Therefore, we give it three minutes. If after that time still nothing listens, we set `spotlighthost` to `none`, indicating that something has gone wrong.

⟨ *wait until the spotlight server is up or faulty* 25c ⟩ ≡

```
trial=0
maxtrials=12
while
  trial=$((trial+1))
  ⟨ check listener on host, port (25d $spotlighthost,25e $spotlightport ) 23c ⟩
  [ $spotlightrunning -ne 0 ] && [ $trial -le $maxtrials ]
do
  sleep 10
done
if
  [ $spotlightrunning -ne 0 ]
then
 export spotlighthost="none"
fi
◇
```

Fragment referenced in 25b.

Start the Spotlight if it is not already running. First find out what the host is on which we may expect to find a listening Spotlight.

Variable `spotlighthost` contains the address of the host where we expect to find Spotlight. If the expectation does not come true, and the Spotlighthost was not localhost, test whether Spotlight can be found on localhost. If the spotlight-server cannot be found, start it up on localhost.

3.9 Download materials

This installer needs to download a lot from different sources:

- Most of the NLP-modules will be built up from their sources in Github. The sources must be cloned.
- Many modules need external resources, e.g. the Alpino tagger. Often these utilities must be downloaded from a location specified by the supplier.
- Many modules use extra resources like model-data, that must be obtained separately.
- Some of the resources are not publicly available. They must be obtained from a pass-word protected URL.
-

Usually downloads are slow, and the duration is only little determined by the resources in the installing computer, but by the network and the performance of the systems from which we download. Therefore, we may speed up by first downloading things, if possible in parallel processes.

We put the following the beginning of the install-script:

⟨ *download everything* 26 ⟩ ≡
```
⟨ download stuff 12f, ... ⟩
echo Waiting for downloads to complete ...
wait
echo Download completed
◇
```
Fragment defined by 10c, 26.
Fragment referenced in 10b.

4 Shared libraries

When we do not want to rely on what the host can present to us, we need to make our own shared libraries. For the present, we will generate the shared libraries `libxslt` and `libxml2`. We do the following:

1. install autoconf, needed to compile the libs.
2. install libxslt
3. install libxml2

4.1 Autoconf

Gnu autoconf is a system to help configure the Makefiles for a software package. Softwarepackages that use this, supply a file `configure`, `configure.in` or `configure.ac`. To compile and install a package from source we can then perform 1) `./configure --prefix=<environment>`; 2) `make`; 3) `make install`.

Get autoconf:

⟨ *download stuff* 27a ⟩ ≡

```
⟨ need to wget (27b autoconf-2.69.tar.gz,27c http://ftp.gnu.org/gnu/autoconf/autoconf-2.69.tar.gz ) 10d ⟩
◇
```

Fragment defined by 12f, 17b, 20a, 27a.
Fragment referenced in 26.

Install autoconf:

⟨ *set up autoconf* 27d ⟩ ≡

```
autoconfdir=‘mktemp -d -t autoconf.XXXXXX‘
cd $autoconfdir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/autoconf-2.69.tar.gz
cd autoconf-2.69
./configure --prefix=$envdir
make
make install
cd $piperoot
rm -rf $autoconfdir
◇
```

Fragment referenced in 6a.
Uses: install 62a, piperoot 9d.

4.2 libxml2 and libxslt

Compilation and installation of libxml2 and libxslt goes similar, according to the following template:

⟨ *install libxml2 or libxslt* 27e ⟩ ≡

```
shtmpdir=‘mktemp -d -t shl.XXXXXX‘
cd $shtmpdir
git clone @1
packagedir=‘ls -1‘
cd $packagedir
./autogen.sh --prefix=$envdir
make
make install
cd $piperoot
rm -rf $shtmpdir

◇
```

Fragment referenced in 27f.
Uses: install 62a, piperoot 9d.

⟨ *install shared libs* 27f ⟩ ≡

```
⟨ install libxml2 or libxslt (27g git://git.gnome.org/libxml2 ) 27e ⟩
⟨ install libxml2 or libxslt (27h git://git.gnome.org/libxslt ) 27e ⟩
◇
```

Fragment referenced in 6a.

4.3 Alpino

Install Alpino as a utility because it is so big, and hard to install on different platforms. Users may choose to install the utilities (and Alpino) by hand and then still install the modules with the script from this file.

Alpino cannot be obtained from an open source repository and there does not seem to be a repository where all the older versions are stored. Therefore, if possible, we will use a copy from our secret archive if that is available. If that is not available, we will download the latest version of Alpino.

⟨ *install Alpino* 28a ⟩ ≡

```
alpinosrc=Alpino-x86_64-Linux-glibc-2.19-21088-sicstus.tar.gz
cd $envdir
if
[ -d "Alpino" ]
then
  echo "Not installing Alpino, because of existing directory $envdir/Alpino"
else
  if
    [ ! -e "$pipesocket/v4.0.0.0_nlpp_resources/$alpinosrc" ]
  then
    echo "Try to install the latest Alpino."
    alpinosrc=latest.tar.gz
    cd $pipesocket/v4.0.0.0_nlpp_resources
    wget http://www.let.rug.nl/vannoord/alp/Alpino/versions/binary/latest.tar.gz
    if
      [ $? -gt 0 ]
    then
      echo "Cannot install Alpino. Please install Alpino in $envdir/Alpino"
      exit 4
    fi
  fi
  cd $envdir
  tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/$alpinosrc
fi
◇
```

Fragment referenced in 6a.
Uses: `install` 62a.

⟨ *set environment parameters* 28b ⟩ ≡

```
export ALPINO_HOME=$envdir/Alpino
◇
```

Fragment defined by 9c, 28b, 29b, 32d, 33c.
Fragment referenced in 9a.
Defines: `ALPINO_HOME` Never used.

4.3.1 Treetagger

Installation of Treetagger goes as follows (See Treetagger's homepage):

1. Download and unpack the Treetagger tarball. This generates the subdirectories `bin`, `cmd` and `doc`
2. Download and unpack the tagger-scripts tarball

The location where Treetagger comes from and the location where it is going to reside:

⟨ *install the treetagger utility* 29a ⟩ ≡
```
TREETAGDIR=treetagger
TREETAGGER_HOME=$envdir/$TREETAGDIR
TREETAG_BASIS_URL=http://www.cis.uni-muenchen.de/%7Eschmid/tools/TreeTagger/data/
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.
Defines: `TREETAGGER_HOME` 29b, 30d, 31a.

⟨ *set environment parameters* 29b ⟩ ≡
```
export TREETAGGER_HOME=$envdir/treetagger
◇
```
Fragment defined by 9c, 28b, 29b, 32d, 33c.
Fragment referenced in 9a.
Uses: `TREETAGGER_HOME` 29a.

The source tarball, scripts and the installation-script:

⟨ *install the treetagger utility* 29c ⟩ ≡
```
TREETAGSRC=tree-tagger-linux-3.2.1.tar.gz
TREETAGSCRIPTS=tagger-scripts.tar.gz
TREETAG_INSTALLSCRIPT=install-tagger.sh
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.
Uses: `install` 62a.

Parametersets:

⟨ *install the treetagger utility* 29d ⟩ ≡
```
DUTCHPARS_UTF_GZ=dutch-par-linux-3.2-utf8.bin.gz
DUTCH_TAGSET=dutch-tagset.txt
DUTCHPARS_2_GZ=dutch2-par-linux-3.2-utf8.bin.gz
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

Download everything in the target directory:

⟨ *install the treetagger utility* 29e ⟩ ≡
```
mkdir -p $envdir/$TREETAGDIR
cd $envdir/$TREETAGDIR
wget $TREETAG_BASIS_URL/$TREETAGSRC
wget $TREETAG_BASIS_URL/$TREETAGSCRIPTS
wget $TREETAG_BASIS_URL/$TREETAG_INSTALLSCRIPT
wget $TREETAG_BASIS_URL/$DUTCHPARS_UTF_GZ
wget $TREETAG_BASIS_URL/$DUTCH_TAGSET
wget $TREETAG_BASIS_URL/$DUTCHPARS_2_GZ
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

Run the install-script:

⟨ *install the treetagger utility* 30a ⟩ ≡
```
chmod 775 $TREETAG_INSTALLSCRIPT
./$TREETAG_INSTALLSCRIPT
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

The scripts in the `cmd` subdirectory contain absolute paths. We can make the treetagger directory-structure location-independent by using relative paths, eg relative to `TREETAGGER_HOME`

⟨ *install the treetagger utility* 30b ⟩ ≡
```
⟨ make treetagger location-independent 30c ⟩
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

It works as follows:

Many of the scripts in the `cmd` subdirectory contain lines like:

```
BIN=<absolute path>/bin
```

We read one of those scripts and extract the contents of `<absolute path>` into variable `indicator`. Then we replace in all scripts occurrences of this text with `${TREETAGGER_HOME}`.

⟨ *make treetagger location-independent* 30c ⟩ ≡
```
⟨ extract the absolute path from one of the scripts 30d ⟩
⟨ replace the absolute paths 31a ⟩
◇
```
Fragment referenced in 30b.

⟨ *extract the absolute path from one of the scripts* 30d ⟩ ≡
```
cmdir=${TREETAGGER_HOME}/cmd
probefile=‘grep -l "^BIN=" ${cmdir}/* | head -n 1‘
indicator=‘cat $probefile | gawk ’/^BIN=/ {⟨ matchscript 30e ⟩}’‘
◇
```
Fragment referenced in 30c.
Uses: `TREETAGGER_HOME` 29a.

⟨ *matchscript* 30e ⟩ ≡
```
match($0, /^BIN=(.*treetagger)\/bin/, arr); print arr[1]◇
```
Fragment referenced in 30d.
Uses: `print` 55b.

⟨ *replace the absolute paths* 31a ⟩ ≡
```
sedcommand="s|$indicator|\${TREETAGGER_HOME}|g"
tempfile=‘mktemp -t mytemp.XXXXXX‘
for file in ${cmdir}/*
do
  mv $file $tempfile
  cat $tempfile | sed $sedcommand >$file
done
rm -rf $tempfile
◇
```
Fragment referenced in 30c.
Uses: TREETAGGER_HOME 29a.

Make the treetagger utilities available for everybody.

⟨ *install the treetagger utility* 31b ⟩ ≡
```
chmod -R o+rx $envdir/$TREETAGDIR/bin
chmod -R o+rx $envdir/$TREETAGDIR/cmd
chmod -R o+r $envdir/$TREETAGDIR/doc
chmod -R o+rx $envdir/$TREETAGDIR/lib
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

Remove the tarballs:

⟨ *install the treetagger utility* 31c ⟩ ≡
```
rm $TREETAGSRC
rm $TREETAGSCRIPTS
rm $TREETAG_INSTALLSCRIPT
rm $DUTCHPARS_UTF_GZ
rm $DUTCH_TAGSET
rm $DUTCHPARS_2_GZ
◇
```
Fragment defined by 29acde, 30ab, 31bc.
Fragment referenced in 6a.

4.3.2 Timbl and Ticcutils

Timbl and Ticcutils are installed from their source-tarballs. The installation is not (yet?) completely reproducibe because it uses the C-compiler that happens to be available on the host. Installation involves:

1. Download the tarball in a temporary directory.
2. Unpack the tarball.
3. cd to the unpacked directory and perform `./configure`, `make` and `make install`. Note the argument that causes the files to be installed in the `lib` and the `bin` sub-directories of the `env` directory.

⟨ *install the ticcutils utility* 31d ⟩ ≡
```
URL=http://software.ticc.uvt.nl/ticcutils-0.7.tar.gz
TARB=ticcutils-0.7.tar.gz
DIR=ticcutils-0.7
⟨ unpack ticcutils or timbl 32b ⟩
◇
```
Fragment referenced in 32c.

⟨ *install the timbl utility* 32a ⟩ ≡
```
TARB=timbl-6.4.6.tar.gz
DIR=timbl-6.4.6
⟨ unpack ticcutils or timbl 32b ⟩
◇
```
Fragment referenced in 32c.

⟨ *unpack ticcutils or timbl* 32b ⟩ ≡
```
SUCCES=0
ticbeldir=‘mktemp -t -d tickbel.XXXXXX‘
cd $ticbeldir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/$TARB
cd $DIR
sh ./bootstrap.sh
./configure --prefix=$envdir
make
make install
cd $piperoot
rm -rf $ticbeldir
◇
```
Fragment referenced in 31d, 32a.
Uses: `install` 62a, `piperoot` 9d.

When the installation has been transplanted, Timbl and Ticcutils have to be re-installed.

⟨ *re-install modules after the transplantation* 32c ⟩ ≡
```
⟨ install the ticcutils utility 31d ⟩
⟨ install the timbl utility 32a ⟩
◇
```
Fragment never referenced.

4.3.3 Svmlib

Svmlib is needed by module svmwsd. That module can install svmlib by itself, but for now we try installation in the prog-environment. We set variable `SVMLIB_HOME` to indicate where the module is located.

⟨ *set environment parameters* 32d ⟩ ≡
```
export SVMLIB_HOME=$envdir/svmlib
◇
```
Fragment defined by 9c, 28b, 29b, 32d, 33c.
Fragment referenced in 9a.
Defines: `SVMLIB_HOME` 33a.

⟨ *install svmlib* 33a ⟩ ≡
```
export SVMLIB_HOME=${envdir}/svmlib
tempdir=‘mktemp -d -t svmlib.XXXXXX‘
cd $tempdir
wget https://github.com/cjlin1/libsvm/archive/master.zip
unzip master.zip
rm master.zip
oridir=‘ls -1 | head -1‘
mv $oridir ${SVMLIB_HOME}
cd ${SVMLIB_HOME}/python
rm -rf $tempdir
make
cd $piperoot
◇
```
Fragment referenced in 6a.
Uses: piperoot 9d, SVMLIB_HOME 32d.

4.3.4 The Boost library

I have no idea how Boost works. Neither can I find out how to test whether boost has been installed already. So we install libboost according to this manual and hope for the best.

⟨ *install boost* 33b ⟩ ≡
```
cd $envdir
tar -xzf $pipesocket/v4.0.0.0_nlpp_resources/20160103_boost_1_54_bin.tgz
◇
```
Fragment referenced in 6a.

Zet de boost libraries in LD_LIBRARY_PATH.

⟨ *set environment parameters* 33c ⟩ ≡
```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$envdir/boost_1_54_0/stage/lib
◇
```
Fragment defined by 9c, 28b, 29b, 32d, 33c.
Fragment referenced in 9a.

5 Install the modules

We make a separate script to install the modules. By default, the modules will be installed in subdirectory modules of the NLPP root directory, but this is not necessarily so.

The script install_modules installs modules that are not yet present.

"../env/bin/install_modules" 33d≡
```
#!/bin/bash
⟨ get location of the script (33e DIR ) 49a ⟩
cd $DIR
source ../../progenv
⟨ variables of the module-installer 49b ⟩
⟨ functions of the module-installer 34b ⟩
⟨ install the modules 35d, ... ⟩
◇
```

⟨ *make scripts executable* 34a ⟩ ≡
```
chmod 775  ../env/bin/install_modules
```
◇

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

Installing a module from Github is very simple:

- Skip installation if the module is already present. Otherwise:
- Clone the module in subdirectory `modules`.
- `cd` to that module and perform script `install`.

⟨ *functions of the module-installer* 34b ⟩ ≡
```
function gitinst (){
   url=$1
   dir=$2
   commitset=$3
   echo "Install $dir" >&2
   cd $piperoot/modules
   if
     [ -e $dir ]
   then
     echo "Not installing existing module $dir"
   else
     git clone $url
     cd $dir
     git checkout $commitset
     ./install
   fi
}
```
◇

Fragment referenced in 33d.
Uses: `install` 62a, `piperoot` 9d.

For each module we generate a script in the `bin` subdirectory to make the module easier to use. The script does the following:

1. Find the directory of itself.
2. Run script `run` in the directory of the module, that can be found as `../<modulename>/run`.

⟨ *contents of shorthand-script* 34c ⟩ ≡
```
#!/bin/bash
⟨ get location of the script (34d thisdir ) 49a ⟩
scriptname=${0##*/}
scriptpath=$thisdir/$scriptname
cd ${thisdir}
⟨ set the naflang parameter 35a ⟩
cat | ../modules/@1/run
```
◇

Fragment referenced in 36adgj, 37beh, 38be, 39bdfi, 40adg, 41ad, 42be.

⟨ *set the naflang parameter* 35a ⟩ ≡

```
if
  [ -z "${naflang}" ]
then
  naffile=‘mktemp -t naf.XXXXXX‘
  cat >$naffile
  naflang=‘cat $naffile | python $envbindir/langdetect.py‘
  export naflang
  cat $naffile | $scriptpath
  result=$?
  rm $naffile
  exit $result
fi
```

◇

Fragment referenced in 34c, 41g.
Uses: `naflang` 46b.

5.1 Parameters in module-scripts

Some modules need parameters. All modules need a language specification. The language can be passed as exported variable `naflang`, but it can also be passed as argument `-l`. Furthermore, some modules need contact with a Spotlight server. With the arguments `-h` and `-b` the host and port of a running Spotlight-server can be passed.

Let us assess a “Parameter-passing” hierarchy for `run` scripts. Basically a “run” script uses default values encoded in the `run` script itself. These values can be overruled by environment parameters. Both default and enviroment parameter settings can be overruled by options that are provided to the `run` commands.

Let us adhere to the policy that we use short one-letter options in `run` scripts, that can be parsed with `getopts`.

The code to obtain command-line arguments in Bash has been obtained from Stackoverflow. The following fragment reads the arguments `-l language`, `-h spotlighthost` and `-p spotlightport`:

⟨ *start of module-script* 35b ⟩ ≡

```
⟨ get location of the script (35c DIR ) 49a ⟩
cd $DIR
source ../progenv
```

◇

Fragment never referenced.

5.1.1 Tokeniser

The tokenizer is the simples of the modules. It needs Java version 1.8. On installation it compiles a Java JAR file, and this is used in the run script.

⟨ *install the modules* 35d ⟩ ≡

```
gitinst https://github.com/PaulHuygen/ixa-pipe-tok.git ixa-pipe-
tok 1a69dbbf337aaf7a97bd21dffcfdbd7cb8ab0d83
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/tok"` 36a≡
⟨ *contents of shorthand-script* (36b `ixa-pipe-tok`) 34c ⟩

◇

5.1.2 Topic detection tool.

The topic detection tool uses Java.

⟨ *install the modules* 36c ⟩ ≡
```
gitinst https://github.com/PaulHuygen/ixa-pipe-topic.git ixa-pipe-
topic b33259ec587b7ead20d9a2cc72d3c68bdbbae163
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/topic"` 36d≡
⟨ *contents of shorthand-script* (36e `ixa-pipe-topic`) 34c ⟩
◇

5.1.3 Morphosyntactic Parser and Alpino

The morphosyntactic parser is in fact a wrapper around Alpino. We have installed Alpino in section **??**. The morpho-syntactic parser expects Alpino to be located in `$envdir/Alpino`.

⟨ *install the modules* 36f ⟩ ≡
```
gitinst https://github.com/PaulHuygen/morphosyntactic_parser_nl.git morphosyntac-
tic_parser_nl 7cfb22ed99e9e72966da5dcafef5527628c16d16
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/mor"` 36g≡
⟨ *contents of shorthand-script* (36h `morphosyntactic_parser_nl`) 34c ⟩
◇

5.1.4 Pos tagger

Use the pos-tagger from EHU for English documents.

⟨ *install the modules* 36i ⟩ ≡
```
gitinst git@github.com:PaulHuygen/ixa-pipe-pos.git ixa-pipe-
pos 518fe51d3f196f0ea5695811425128181565b5d7
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/pos"` 36j≡
⟨ *contents of shorthand-script* (36k `ixa-pipe-pos`) 34c ⟩
◇

5.1.5 Named entity recognition (NERC)

⟨ *install the modules* 37a ⟩ ≡

```
gitinst git@github.com:PaulHuygen/ixa-pipe-nerc.git ixa-pipe-
nerc b365a180e3e9989f2ff4afcb5957290bc4bfe45f
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/nerc" 37b≡

⟨ *contents of shorthand-script* (37c `ixa-pipe-nerc`) 34c ⟩

◇

5.1.6 Word-sense disambiguation (WSD)

⟨ *install the modules* 37d ⟩ ≡

```
gitinst https://github.com/PaulHuygen/svm_wsd.git svm_wsd 62080274247e2dd32226e730776f2d447e90e753
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/wsd" 37e≡

⟨ *contents of shorthand-script* (37f `svm_wsd`) 34c ⟩

◇

5.1.7 NED

The NED module is rather picky about the structure of the NAF file. In any case, it does not accept a file that has been produced by the ontotagger. Hence, in a pipeline NED should be executed before the ontotagger.

The NED module wants to consult the Dbpedia Spotlight server, so that one has to be installed somewhere. For this moment, let us suppose that it has been installed on localhost.

⟨ *install the modules* 37g ⟩ ≡

```
gitinst git@github.com:PaulHuygen/ixa-pipe-ned.git ixa-pipe-
ned 0917a095e719ce909da5db97a5f36934cbc4f5e5
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/ned" 37h≡

⟨ *contents of shorthand-script* (37i `ixa-pipe-ned`) 34c ⟩

◇

5.1.8 Dark-entity relinker

The "Dark Entity Relinker" tries to link "Dark entities" (named entities that have not been recognized) to the link of a known entity with a similar name structure that has been found in the same text.

⟨ *install the modules* 38a ⟩ ≡
```
gitinst git@github.com:PaulHuygen/entity-relink-pipeline.git entity-relink-
pipeline a534c5708c02217cc9bd1a3369db9c6a056711c0
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/derel" 38b≡
⟨ *contents of shorthand-script* (38c `entity-relink-pipeline`) 34c ⟩
◇

5.1.9 Heideltime

The code for Heideltime can be found in Github. This repo contains an adapted Jar file.

Use Heideltime via a wrapper, `ixa-pipe-time`, obtained from Github.

Although suggested otherwise, Heideltime seems not to use Treetagger. It works

⟨ *install the modules* 38d ⟩ ≡
```
gitinst git@github.com:PaulHuygen/ixa-pipe-time.git ixa-pipe-
time 47a47e44faa7f540bf233531f4f6be97659825ea
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/heideltime" 38e≡
⟨ *contents of shorthand-script* (38f `ixa-pipe-time`) 34c ⟩
◇

5.1.10 Ontotagger, Framenet-SRL and nominal events

- Een directory voor drie modules.
- Verwacht module `vua-resources` in een parallelle directory.

The three modules ontotagger (aka "predicatematrix"), Framenet-SRL and nominal event detection are based on the same software packages and resources. The three modules need the same jar `ontotagger-1.0-jar-with-dependencies.jar`, they need resources from the `cltl/vua_resources` Github repository and they are going to execute a script that resides in the scripts directory of the `cltl/OntoTagger` repository. So, what we have to do is:

1. Install from the `cltl/OntoTagger` repository.
2. Create the jar and put it in an appropriate place.
3. install from the `cltl\vua-resources` repository.
4. generate a script fot each of the modules.

In fact, items 2 and 3 are performed by script `install.sh` from the OntoTagger repository.

⟨ *install the modules* 39a ⟩ ≡

```
gitinst git@github.com:PaulHuygen/OntoTagger.git OntoTag-
ger 3177a4c64cc44aabbbe9cf96d5fa004a1f2afb19
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

The "Ontotagger" script:

`"../bin/onto"` 39b≡

⟨ *contents of shorthand-script* (39c `OntoTagger`) 34c ⟩

◇

The "Nominal Event Coreference" script:

`"../bin/nomevent"` 39d≡

⟨ *contents of shorthand-script* (39e `Nominal_Events`) 34c ⟩

◇

The "Framenet SRL" script:

`"../bin/framesrl"` 39f≡

⟨ *contents of shorthand-script* (39g `Framenet_SRL`) 34c ⟩

◇

5.1.11 NED-reranker

⟨ *install the modules* 39h ⟩ ≡

```
gitinst git@github.com:PaulHuygen/NWRDomainModel.git NWRDomain-
Model 509a84b2c5ac1c0f6589731bc8f1cf22c7a19814
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/nedrer"` 39i≡

⟨ *contents of shorthand-script* (39j `NWRDomainModel`) 34c ⟩

◇

5.1.12 Wikify module

Wikify needs spotlight.

⟨ *install the modules* 39k ⟩ ≡

```
gitinst git@github.com:PaulHuygen/ixa-pipe-wikify.git ixa-pipe-
wikify 90a25e13c3a957178b51264277f69b5f258b7447
```

◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/wikify" 40a≡
⟨ *contents of shorthand-script* (40b `ixa-pipe-wikify`) 34c ⟩
◇

5.1.13 UKB

The UKB WSD module is up to now only available from closed repositories.There exists a repository ukb in Git, but this does not seem to include the scripts to process NAF. Therefore, we need to have the repo available beforehand.

⟨ *install the modules* 40c ⟩ ≡
```
# UKB
if
  [ -e $snapshotdir/20170712_EHU-ukb.v30.tgz ]
then
  cd $modulesdir
  tar -xzf $snapshotdir/20170712_EHU-ukb.v30.tgz
else
  echo "No UKB"
  exit 1
fi
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/m4_ukbcript" 40d≡
⟨ *contents of shorthand-script* (40e `EHU-ukb.v30`) 34c ⟩
◇

5.1.14 IMS-WSD

⟨ *install the modules* 40f ⟩ ≡
```
gitinst git@github.com:PaulHuygen/it_makes_sense_WSD.git it_makes_sense_WSD 79a39f53fd7aef20f7667325d
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/m4_ewsdscript" 40g≡
⟨ *contents of shorthand-script* (40h `it_makes_sense_WSD`) 34c ⟩
◇

5.1.15 Semantic Role labelling

⟨ *install the modules* 40i ⟩ ≡
```
gitinst git@github.com:PaulHuygen/vua-srl-nl.git vua-srl-
nl 060264b40e7b856a14408bfa2b56c6c036cfb1fe
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/srl" 41a≡
⟨ *contents of shorthand-script* (41b `vua-srl-nl`) 34c ⟩
◇

5.1.16 srl-Dutch nominals

⟨ *install the modules* 41c ⟩ ≡
```
gitinst git@github.com:PaulHuygen/vua-srl-dutch-nominal-events.git vua-srl-dutch-
nominal-events 1c01df721a0411049d7ad4b5d3cd41a3ccd3eeb5
```
◇
Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

"../bin/srl-dutch-nominals" 41d≡
⟨ *contents of shorthand-script* (41e `vua-srl-dutch-nominal-events`) 34c ⟩
◇

5.1.17 Factuality

We have module `vua_factuality` to identify event-factuality in English texts and module `multilingual_factuality` to identify event-factuality in non-English texts.

⟨ *install the modules* 41f ⟩ ≡
```
gitinst git@github.com:PaulHuygen/multilingual_factuality.git multilin-
gual_factuality a09d815212e047a1cef7109e8c299c9913278d67
gitinst git@github.com:PaulHuygen/vua_factuality.git vua_factuality a09d815212e047a1cef7109e8c299c991
```
◇
Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

The shorthandscript runs the module in `vua_factuality` for english documents and it runs the module in `multilingual_factuality` for documents in other languages.

"../bin/factuality" 41g≡
```
#!/bin/bash
⟨ get location of the script (41h thisdir ) 49a ⟩
scriptname=${0##*/}
scriptpath=$thisdir/$scriptname
⟨ set the naflang parameter 35a ⟩
cd ${thisdir}
if
  [ "${naflang}" == "en" ]
then
  cat | ../modules/vua_factuality/run
else
  cat | ../modules/multilingual_factuality/run
fi

```
◇

5.1.18 Opinion miner

The opinion-miner needs models that are not yet available from an open repository. The installer expects the variable `opinion_models_ball_path` to contain the full path to the tarball with the opinion-models.

⟨ *install the modules* 42a ⟩ ≡
```
export opinion_models_ball_path=${snapshotdir}/models_opinion_miner_deluxePP.tgz
gitinst git@github.com:PaulHuygen/opinion_miner_deluxePP.git opin-
ion_miner_deluxePP 93cd9e4a35f5964edf8f121b4d18bcb9534bb196
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.
Defines: `opinion_models_ball_path` Never used.

`"../bin/opinimin"` 42b≡
⟨ *contents of shorthand-script* (42c `opinion_miner_deluxePP`) 34c ⟩
◇

5.1.19 Event coreference

The event-coreference module is language-independent. It is a module in a jar-file that can be built with the Github git@github.com:PaulHuygen/EventCoreference.git repo. The module uses resources from the `vua-resources` Github repo.

⟨ *install the modules* 42d ⟩ ≡
```
gitinst git@github.com:PaulHuygen/EventCoreference.git EventCorefer-
ence 24e818a23e9e492e24e2b26af8a09baf5d1d6289
```
◇

Fragment defined by 35d, 36cfi, 37adg, 38ad, 39ahk, 40cfi, 41cf, 42ad.
Fragment referenced in 33d.

`"../bin/evcoref"` 42e≡
⟨ *contents of shorthand-script* (42f `EventCoreference`) 34c ⟩
◇

6 Utilities

6.1 Language detection

The following script `../env/bin/langdetect.py` discerns the language of the NAF document that it reads from standard in. If it cannot find the language, it prints `unknown`. The macro `set the language variable` uses this script to set variable `naflang`. All pipeline modules expect that this veriable has been set.

"../env/bin/langdetect.py" 43a≡

```
#!/usr/bin/env python
# langdetect -- Detect the language of a NAF document.
#
import xml.etree.ElementTree as ET
import sys
import re
xmldoc = sys.stdin.read()
#print xmldoc
root = ET.fromstring(xmldoc)
# print root.attrib['lang']
lang = "unknown"
for k in root.attrib:
   if re.match(".*lang$", k):
     language = root.attrib[k]
print(language)
◇
```

Uses: print 55b.

⟨ *make scripts executable* 43b ⟩ ≡

```
chmod 775  ../env/bin/langdetect.py
◇
```

Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

The module-scripts depend on the existence of variable naflang. In most cases this is not a problem because the scripts run in a surrounding script that sets naflang. However, a users may occasionally run a module-script stand-alone e.g. to debug. In that case, we can read the language from the NAF, set variable naflang, and then run the module-script in a subshell. We assume that variable scriptpath contains the path of the script itself.

The macro does the following if naflang has not been set:

1. Save the content of standard in to a temporary file.
2. Run langdetect with the temporary file as input and set the naflang variable.
3. Run the script $scriptpath (i.e. itself) with the temporary file as input.
4. Remove the temporary file.
5. Exit itself with the errorcode of the sub-script that it has run.

⟨ *run in subshell when naflang is not known* 43c ⟩ ≡

```
if
  [ -z "${naflang+x}" ]
then
  naffile=‘mktemp -t naf.XXXXXX‘
  cat >$naffile
  naflang=‘cat $naffile | python $envbindir/langdetect.py‘
  export naflang
  cat $naffile | $scriptpath
  result=$?
  rm $naffile
  exit $result
fi
◇
```

Fragment never referenced.
Uses: naflang 46b.

⟨ *run only if language is English or Dutch* 44 ⟩ ≡

```
if
  [ ! "$naflang" == "nl" ] && [ ! "$naflang" == "en" ]
then
  exit 6
fi
◇
```

Fragment never referenced.
Uses: `naflang` 46b.

6.2 Run-script and test-script

The script `nlpp` reads a NAF document from standard in and produces an annotated NAF on standard out. The script `test` annotates either a test-document that resides in the nuweb directory or a user-provided document and leaves the intermediate results in its working directory `nlpp/test`, so that, in case of problems, it is easy traceable what went wrong.

The annotion process involves a sequence in which an NLP module reads a file that contains the output from a previous module (or the input NAF file), processes it and writes the result in another file.

The following function, `runmodule`, performs the action of a single module in the sequence. It needs three arguments: 1) the name of the NAF file that the previous module produced or the input file; 2) the name of directory in which the module resides and 3) the name of the output NAF.

The function uses variable `moduleresult` to decide whether it is really going to annotate. If this variable is "false" (i.e., not equal to zero), this means that one of the previous modules failed, and it is of no use to process the input file. In that case, the function leaves `moderesult` as it is and does not process the input-file. Otherwise, it will process the input-file and it sets `moduleresult` to the result of the processing module.

⟨ *function to run a module* 45a ⟩ ≡

```
export moduleresult=0

function runmodule {
  local infile=$1
  local modulecommand=$modulesdir/$2/run
  local outfile=$3
  if
    [ $moduleresult -eq 0 ]
  then
    cat $infile | $modulecommand > $outfile
    moduleresult=$?
    if
      [ $moduleresult -gt 0 ]
    then
      failmodule=$modulecommand
      echo "Failed: module $modulecommand; result $moduleresult" >&2
      exit $moduleresult
    else
       echo "Completed: module $modulecommand; result $moduleresult" >&2
    fi
  fi
}

◇
```

Fragment referenced in 48ab.
Defines: `moduleresult` 48ab, `runmodule` 45b, 46a.

Use the function to annotate a NAF file that `infile` points to and write the result in a file that `outfile` points to:

⟨ *annotate dutch document* 45b ⟩ ≡

```
runmodule $infile    ixa-pipe-tok    tok.naf
runmodule tok.naf     ixa-pipe-topic    top.naf
runmodule top.naf     morphosyntactic_parser_nl      pos.naf
runmodule pos.naf     ixa-pipe-nerc          nerc.naf
runmodule nerc.naf    svm_wsd           wsd.naf
runmodule wsd.naf     ixa-pipe-ned           ned.naf
runmodule ned.naf     entity-relink-pipeline        derel.naf
runmodule derel.naf   ixa-pipe-time        times.naf
runmodule times.naf   OntoTagger          onto.naf
runmodule onto.naf    vua-srl-nl        srl.naf
runmodule srl.naf     Nominal_Events         nomev.naf
runmodule nomev.naf   vua-srl-dutch-nominal-events        psrl.naf
runmodule psrl.naf    Framenet_SRL      fsrl.naf
runmodule fsrl.naf    multilingual_factuality fact.naf
runmodule fact.naf    EventCoreference       $outfile

◇
```

Fragment referenced in 46b.
Uses: `runmodule` 45a.

Similar for an English naf:

⟨ *annotate english document* 46a ⟩ ≡

```
runmodule $infile    ixa-pipe-tok tok.naf
runmodule tok.naf     ixa-pipe-topic top.naf
runmodule top.naf     ixa-pipe-pos       pos.naf
runmodule pos.naf     ixa-pipe-nerc       nerc.naf
runmodule nerc.naf    svm_wsd        wsd.naf
runmodule wsd.naf     ixa-pipe-ned        ned.naf
runmodule ned.naf     entity-relink-pipeline     derel.naf
runmodule derel.naf   NWRDomainModel     nedr.naf
runmodule nedr.naf    ixa-pipe-wikify     wikif.naf
runmodule wikif.naf   EHU-ukb.v30        ukb.naf
```

◇

Fragment referenced in 46b.
Uses: `runmodule` 45a.

Determine the language and select one of the above macro's to annotate the document. In fact, consider the document as an English document unless `naflang` is "nl"

⟨ *annotate* 46b ⟩ ≡

```
naflang=‘cat $infile | /home/huygen/projecten/pipelines/nlpp/env/bin/langdetect.py‘
export naflang
if
 [ "$naflang" == "nl" ]
then
  ⟨ annotate dutch document 45b ⟩
else
  ⟨ annotate english document 46a ⟩
fi
```

◇

Fragment referenced in 48ab.
Defines: `naflang` 21c, 22a, 23ab, 25a, 35a, 41g, 43c, 44, 47.

Use the above "annotate" macro in a test script and in a run script. The scripts set a working directory and put the input-file in it, and then annotate it.

The test-script uses a special test-directory and leaves it behind when it is finished. If the user specified a language, the script copies a NAF testfile from the nuweb directory as input-file. Otherwise, the script expects the test-directory to be present, with an input-file (named `in.naf`) in it.

⟨ *get a testfile and set naflang or die* 47 ⟩ ≡

```
cd $workdir
naflang=""
if
  [ "$1" == "en" ]
then
  cp $nuwebdir/test.en.in.naf $infile
  export naflang="en"
else
  if
    [ "$1" == "nl" ]
  then
    cp $nuwebdir/test.nl.in.naf  $infile
    export naflang="nl"
  fi
fi
if
  [ -e $infile ]
then
  if
    [ "$naflang" == "" ]
  then
    naflang=‘cat $infile | python $envbindir/langdetect.py‘
  fi
else
  echo "Please supply test-file $workdir/$infile or specify language"
  exit 4
fi
◇
```

Fragment referenced in 48a.
Uses: naflang 46b.

This is the test-script:

"../bin/test" 48a≡
```
#!/bin/bash
DIR="$( cd "$( dirname "${BASH_SOURCE[0]}" )" && pwd )"
rdir=$(dirname "$DIR")
source $rdir/progenv
oldd=‘pwd‘
workdir=$piperoot/test
mkdir -p $workdir
cd $workdir
infile=in.naf
outfile=out.naf
⟨ get a testfile and set naflang or die 47 ⟩
⟨ find a spotlightserver or exit 23a ⟩
⟨ function to run a module 45a ⟩
⟨ annotate 46b ⟩
if
  [ $moduleresult -eq 0 ]
then
  echo Test succeeded.
else
  echo Something went wrong.
fi
exit $moduleresult
◇
```
Uses: moduleresult 45a, piperoot 9d.

The run-script nlpp reads a “raw” naf from standard in and produces an annotated naf on standard out. It creates a temporary directory to store intermediate results from the modules and removes this directory afterwards.

"../bin/nlpp" 48b≡
```
#!/bin/bash
oldd=‘pwd‘
workdir=‘mktemp -d -t nlpp.XXXXXX‘
cd $workdir
cat >$workdir/$infile
⟨ function to run a module 45a ⟩
⟨ annotate 46b ⟩
if
  [ $moduleresult -eq 0 ]
then
  cat $outfile
fi
cd $oldd
rm -rf $workdir
exit $moduleresult
◇
```
Uses: moduleresult 45a.

7 Miscellaneous

7.1 Locate the path to the script itself

The following macro finds the directory in which the script itself or the sourced script itself is located.

⟨ *get location of the script* 49a ⟩ ≡
```
@1="$( cd "$( dirname "${BASH_SOURCE[0]}" )" && pwd)"
```
◇

Fragment referenced in 6a, 7a, 9a, 15f, 21a, 33d, 34c, 35b, 41g.

7.2 Logging

Write log messages to standard out if variable `LOGLEVEL` is equal to 1.

⟨ *variables of the module-installer* 49b ⟩ ≡
```
LOGLEVEL=1
```
◇

Fragment referenced in 33d.

⟨ *logmess* 49c ⟩ ≡
```
if
 [ $LOGLEVEL -gt 0 ]
then
 echo @1
fi
```
◇

Fragment never referenced.

A How to read and translate this document

This document is an example of *literate programming* [2]. It contains the code of all sorts of scripts and programs, combined with explaining texts. In this document the literate programming tool `nuweb` is used, that is currently available from Sourceforge (URL:`nuweb.sourceforge.net`). The advantages of Nuweb are, that it can be used for every programming language and scripting language, that it can contain multiple program sources and that it is very simple.

A.1 Read this document

The document contains *code scraps* that are collected into output files. An output file (e.g. `output.fil`) shows up in the text as follows:

`"output.fil"` 4a ≡
```
# output.fil
```
< a macro 4b >
< another macro 4c >
◇

The above construction contains text for the file. It is labelled with a code (in this case 4a) The constructions between the < and > brackets are macro's, placeholders for texts that can be found in other places of the document. The test for a macro is found in constructions that look like:

< a macro 4b > ≡
```
This is a scrap of code inside the macro.
It is concatenated with other scraps inside the
macro. The concatenated scraps replace
the invocation of the macro.
```

```
Macro defined by 4b, 87e
Macro referenced in 4a
```

Macro's can be defined on different places. They can contain other macro's.

< a scrap 87e > ≡

```
    This is another scrap in the macro. It is
    concatenated to the text of scrap 4b.
    This scrap contains another macro:
    < another macro 45b >
```

```
Macro defined by 4b, 87e
Macro referenced in 4a
```

A.2 Process the document

The raw document is named `a_nlpp.w`. Figure 2 shows pathways to translate it into print-

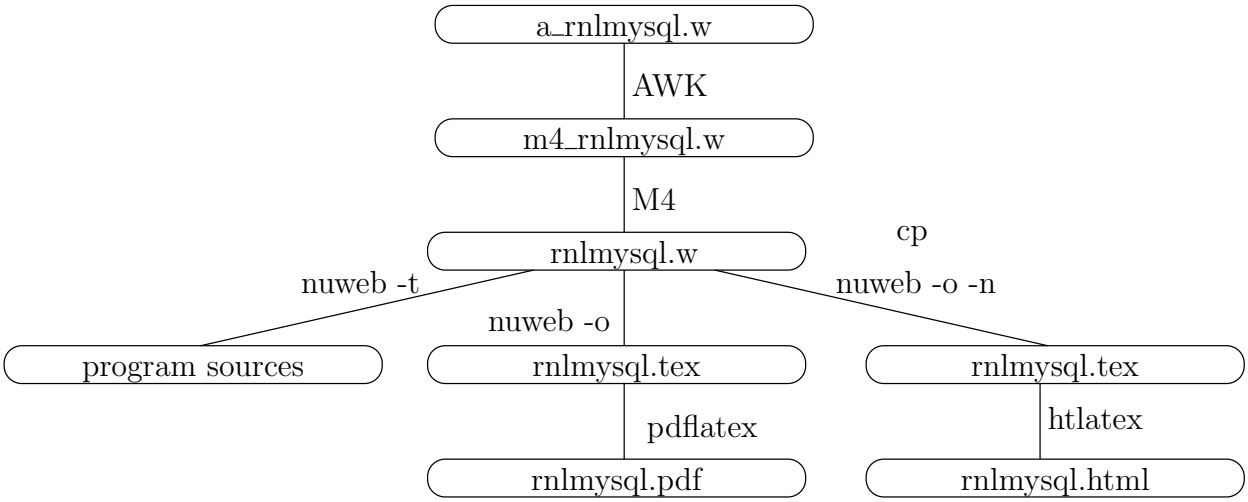

Figure 2: *Translation of the raw code of this document into printable/viewable documents and into program sources. The figure shows the pathways and the main files involved.*

able/viewable documents and to extract the program sources. Table 3 lists the tools that are

Tool	**Source**	**Description**
gawk	`www.gnu.org/software/gawk/`	text-processing scripting language
M4	`www.gnu.org/software/m4/`	Gnu macro processor
nuweb	`nuweb.sourceforge.net`	Literate programming tool
tex	`www.ctan.org`	Typesetting system
tex4ht	`www.ctan.org`	Convert TEX documents into `xml`/`html`

Table 3: *Tools to translate this document into readable code and to extract the program sources*

needed for a translation. Most of the tools (except Nuweb) are available on a well-equipped Linux system.

⟨ *parameters in Makefile* 51a ⟩ ≡
```
NUWEB=../env/bin/nuweb
```
◇
Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Uses: `nuweb` 57d.

A.3 The Makefile for this project.

This chapter assembles the Makefile for this project.

`"Makefile"` 51b≡
⟨ *default target* 51c ⟩

⟨ *parameters in Makefile* 51a, ... ⟩

⟨ *impliciete make regels* 54c, ... ⟩
⟨ *expliciete make regels* 52b, ... ⟩
⟨ *make targets* 51d, ... ⟩
◇

The default target of make is `all`.

⟨ *default target* 51c ⟩ ≡
```
all : ⟨ all targets 51e ⟩
.PHONY : all
```
◇
Fragment referenced in 51b.
Defines: `all` Never used, `PHONY` 55a.

⟨ *make targets* 51d ⟩ ≡
```
clean:
        ../env/bin/clean_infrastructure
```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.

The default is, to install nlpp.

⟨ *all targets* 51e ⟩ ≡
```
install
```
◇
Fragment referenced in 51c.
Uses: `install` 62a.

We use many suffixes that were not known by the C-programmers who constructed the `make` utility. Add these suffixes to the list.

⟨ *parameters in Makefile* 52a ⟩ ≡

```
.SUFFIXES: .pdf .w .tex .html .aux .log .php
```

◇

Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Defines: `SUFFIXES` Never used.
Uses: `pdf` 55b.

A.4 Get Nuweb

An annoying problem is, that this program uses nuweb, a utility that is seldom installed on a computer. Therefore, we are going to install that first if it is not present. Unfortunately, nuweb is hosted on sourceforge and it is difficult to achieve automatic downloading from that repository. Therefore I copied one of the versions on a location from where it can be downloaded with a script.

Put the nuweb binary in the nuweb subdirectory, so that it can be used before the directory-structure has been generated.

⟨ *expliciete make regels* 52b ⟩ ≡

```
nuweb: $(NUWEB)

$(NUWEB): ../nuweb-1.58
        mkdir -p ../env/bin
        cd ../nuweb-1.58 && make nuweb
        cp ../nuweb-1.58/nuweb $(NUWEB)
```

◇

Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.
Uses: `nuweb` 57d.

⟨ *clean up* 52c ⟩ ≡

```
rm -rf ../nuweb-1.58
```

◇

Fragment never referenced.
Uses: `nuweb` 57d.

⟨ *expliciete make regels* 52d ⟩ ≡

```
../nuweb-1.58:
        cd .. && wget http://kyoto.let.vu.nl/~huygen/nuweb-1.58.tgz
        cd .. &&  tar -xzf nuweb-1.58.tgz
```

◇

Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.
Uses: `nuweb` 57d.

A.5 Pre-processing

To make usable things from the raw input `a_nlpp.w`, do the following:

1. Process `$` characters.
2. Run the m4 pre-processor.
3. Run nuweb.

This results in a LaTeX file, that can be converted into a PDF or a HTML document, and in the program sources and scripts.

A.5.1 Process 'dollar' characters

Many "intelligent" TeX editors (e.g. the auctex utility of Emacs) handle `$` characters as special, to switch into mathematics mode. This is irritating in program texts, that often contain `$` characters as well. Therefore, we make a stub, that translates the two-character sequence `\$` into the single `$` character.

⟨ *expliciete make regels* 53a ⟩ ≡

```
m4_nlpp.w : a_nlpp.w
        gawk '{if(match($$0, "@%")) {printf("%s", substr($$0,1,RSTART-
1))} else print}' a_nlpp.w \
          | gawk '{gsub(/[\\][\$$]/, "$$");print}'  > m4_nlpp.w
```

◇

Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.
Uses: `print` 55b.

A.5.2 Run the M4 pre-processor

⟨ *expliciete make regels* 53b ⟩ ≡

```
nlpp.w : m4_nlpp.w inst.m4
        m4 -P m4_nlpp.w > nlpp.w
```

◇

Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.

A.6 Typeset this document

Enable the following:

1. Create a PDF document.
2. Print the typeset document.
3. View the typeset document with a viewer.
4. Create a HTMLdocument.

In the three items, a typeset PDF document is required or it is the requirement itself.

A.6.1 Figures

This document contains figures that have been made by `xfig`. Post-process the figures to enable inclusion in this document.

The list of figures to be included:

⟨ *parameters in Makefile* 54a ⟩ ≡

```
FIGFILES=fileschema directorystructure
```

◇

Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Defines: `FIGFILES` 54b.

We use the package `figlatex` to include the pictures. This package expects two files with extensions `.pdftex` and `.pdftex_t` for `pdflatex` and two files with extensions `.pstex` and `.pstex_t` for the `latex/dvips` combination. Probably tex4ht uses the latter two formats too.

Make lists of the graphical files that have to be present for latex/pdflatex:

⟨ *parameters in Makefile* 54b ⟩ ≡

```
FIGFILENAMES=$(foreach fil,$(FIGFILES), $(fil).fig)
PDFT_NAMES=$(foreach fil,$(FIGFILES), $(fil).pdftex_t)
PDF_FIG_NAMES=$(foreach fil,$(FIGFILES), $(fil).pdftex)
PST_NAMES=$(foreach fil,$(FIGFILES), $(fil).pstex_t)
PS_FIG_NAMES=$(foreach fil,$(FIGFILES), $(fil).pstex)
```

◇

Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Defines: `FIGFILENAMES` Never used, `PDFT_NAMES` 56a, `PDF_FIG_NAMES` 56a, `PST_NAMES` Never used, `PS_FIG_NAMES` Never used.
Uses: `FIGFILES` 54a.

Create the graph files with program `fig2dev`:

⟨ *impliciete make regels* 54c ⟩ ≡

```
%.eps: %.fig
        fig2dev -L eps $< > $@

%.pstex: %.fig
        fig2dev -L pstex $< > $@

.PRECIOUS : %.pstex
%.pstex_t: %.fig %.pstex
        fig2dev -L pstex_t -p $*.pstex $< > $@

%.pdftex: %.fig
        fig2dev -L pdftex $< > $@

.PRECIOUS : %.pdftex
%.pdftex_t: %.fig %.pstex
        fig2dev -L pdftex_t -p $*.pdftex $< > $@
```

◇

Fragment defined by 54c, 59a.
Fragment referenced in 51b.
Defines: `fig2dev` Never used.

A.6.2 Bibliography

To keep this document portable, create a portable bibliography file. It works as follows: This document refers in the |bibliography| statement to the local `bib`-file `nlpp.bib`. To create this file, copy the auxiliary file to another file `auxfil.aux`, but replace the argument of the command `\bibdata{nlpp}` to the names of the bibliography files that contain the actual references (they should exist on the computer on which you try this). This procedure should only be performed on the computer of the author. Therefore, it is dependent of a binary file on his computer.

⟨ *expliciete make regels* 55a ⟩ ≡
```
bibfile : nlpp.aux /home/paul/bin/mkportbib
        /home/paul/bin/mkportbib nlpp litprog

.PHONY : bibfile
```
◇
Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.
Uses: PHONY 51c.

A.6.3 Create a printable/viewable document

Make a PDF document for printing and viewing.

⟨ *make targets* 55b ⟩ ≡
```
pdf : nlpp.pdf

print : nlpp.pdf
        lpr nlpp.pdf

view : nlpp.pdf
        evince nlpp.pdf

```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Defines: `pdf` 52a, 56a, `print` 16bc, 23a, 30e, 43a, 53a, `view` Never used.

Create the PDF document. This may involve multiple runs of nuweb, the LaTeX processor and the bibTeX processor, and depends on the state of the `aux` file that the LaTeX processor creates as a by-product. Therefore, this is performed in a separate script, `w2pdf`.

The w2pdf script The three processors nuweb, LaTeX and bibTeX are intertwined. LaTeX and bibTeX create parameters or change the value of parameters, and write them in an auxiliary file. The other processors may need those values to produce the correct output. The LaTeX processor may even need the parameters in a second run. Therefore, consider the creation of the (PDF) document finished when none of the processors causes the auxiliary file to change. This is performed by a shell script `w2pdf`.

⟨ *make targets* 56a ⟩ ≡
```
nlpp.pdf : nlpp.w $(W2PDF)  $(PDF_FIG_NAMES) $(PDFT_NAMES)
        chmod 775 $(W2PDF)
        $(W2PDF) $*
```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Uses: pdf 55b, PDFT_NAMES 54b, PDF_FIG_NAMES 54b.

The following is an ugly fix of an unsolved problem. Currently I develop this thing, while it resides on a remote computer that is connected via the `sshfs` filesystem. On my home computer I cannot run executables on this system, but on my work-computer I can. Therefore, place the following script on a local directory.

⟨ *directories to create* 56b ⟩ ≡
```
../nuweb/bin ◇
```
Fragment defined by 8abcd, 56b.
Fragment referenced in 61b.
Uses: nuweb 57d.

⟨ *parameters in Makefile* 56c ⟩ ≡
```
W2PDF=../nuweb/bin/w2pdf
◇
```
Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Uses: nuweb 57d.

⟨ *expliciete make regels* 56d ⟩ ≡
```
$(W2PDF) : nlpp.w $(NUWEB)
        $(NUWEB) nlpp.w
◇
```
Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.

"../nuweb/bin/w2pdf" 56e≡
```
#!/bin/bash
# w2pdf -- compile a nuweb file
# usage: w2pdf [filename]
# 20170713 at 1812h: Generated by nuweb from a_nlpp.w
NUWEB=../env/bin/nuweb
LATEXCOMPILER=pdflatex
⟨ filenames in nuweb compile script 57b ⟩
⟨ compile nuweb 57a ⟩

◇
```
Uses: nuweb 57d.

The script retains a copy of the latest version of the auxiliary file. Then it runs the four processors nuweb, LaTeX, MakeIndex and bibTeX, until they do not change the auxiliary file or the index.

⟨ *compile nuweb* 57a ⟩ ≡
```
NUWEB=/home/huygen/projecten/pipelines/nlpp/env/bin/nuweb
⟨ run the processors until the aux file remains unchanged 58a ⟩
⟨ remove the copy of the aux file 57c ⟩
◇
```
Fragment referenced in 56e.
Uses: `nuweb` 57d.

The user provides the name of the nuweb file as argument. Strip the extension (e.g. `.w`) from the filename and create the names of the LaTeX file (ends with `.tex`), the auxiliary file (ends with `.aux`) and the copy of the auxiliary file (add `old.` as a prefix to the auxiliary filename).

⟨ *filenames in nuweb compile script* 57b ⟩ ≡
```
nufil=$1
trunk=${1%%.*}
texfil=${trunk}.tex
auxfil=${trunk}.aux
oldaux=old.${trunk}.aux
indexfil=${trunk}.idx
oldindexfil=old.${trunk}.idx
◇
```
Fragment referenced in 56e.
Defines: `auxfil` 58a, 60ab, `indexfil` 58a, 60a, `nufil` 57d, 60ac, `oldaux` 57c, 58a, 60ab, `oldindexfil` 58a, 60a, `texfil` 57d, 60ac, `trunk` 57d, 60acd.

Remove the old copy if it is no longer needed.

⟨ *remove the copy of the aux file* 57c ⟩ ≡
```
rm $oldaux
◇
```
Fragment referenced in 57a, 59e.
Uses: `oldaux` 57b, 60a.

Run the three processors. Do not use the option `-o` (to suppres generation of program sources) for nuweb, because `w2pdf` must be kept up to date as well.

⟨ *run the three processors* 57d ⟩ ≡
```
$NUWEB $nufil
$LATEXCOMPILER $texfil
makeindex $trunk
bibtex $trunk
◇
```
Fragment referenced in 58a.
Defines: `bibtex` 60cd, `makeindex` 60cd, `nuweb` 9e, 51a, 52bcd, 56bce, 57a, 58b, 59d.
Uses: `nufil` 57b, 60a, `texfil` 57b, 60a, `trunk` 57b, 60a.

Repeat to copy the auxiliary file and the index file and run the processors until the auxiliary file and the index file are equal to their copies. However, since I have not yet been able to test the `aux` file and the `idx` in the same test statement, currently only the `aux` file is tested.

It turns out, that sometimes a strange loop occurs in which the `aux` file will keep to change. Therefore, with a counter we prevent the loop to occur more than 10 times.

⟨ *run the processors until the aux file remains unchanged* 58a ⟩ ≡

```
LOOPCOUNTER=0
while
  ! cmp -s $auxfil $oldaux
do
  if [ -e $auxfil ]
  then
   cp $auxfil $oldaux
  fi
  if [ -e $indexfil ]
  then
   cp $indexfil $oldindexfil
  fi
  ⟨ run the three processors 57d ⟩
  if [ $LOOPCOUNTER -ge 10 ]
  then
    cp $auxfil $oldaux
  fi;
done
◇
```

Fragment referenced in 57a.
Uses: `auxfil` 57b, 60a, `indexfil` 57b, `oldaux` 57b, 60a, `oldindexfil` 57b.

A.6.4 Create HTML files

HTML is easier to read on-line than a PDF document that was made for printing. We use `tex4ht` to generate HTML code. An advantage of this system is, that we can include figures in the same way as we do for `pdflatex`.

To create a HTML doc, we do the following:

1. Create a directory `../nuweb/html` for the HTML document.
2. Put the nuweb source in it, together with style-files that are needed (see variable `HTMLSOURCE`).
3. Put the script `w2html` in it and make it executable.
4. Execute the script `w2html`.

Make a list of the entities that we mentioned above:

⟨ *parameters in Makefile* 58b ⟩ ≡

```
htmldir=../nuweb/html
htmlsource=nlpp.w nlpp.bib html.sty artikel3.4ht w2html
htmlmaterial=$(foreach fil, $(htmlsource), $(htmldir)/$(fil))
htmltarget=$(htmldir)/nlpp.html
◇
```

Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Uses: `nuweb` 57d.

Make the directory:

⟨ *expliciete make regels* 58c ⟩ ≡

```
$(htmldir) :
        mkdir -p $(htmldir)

◇
```

Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.

The rule to copy files in it:

⟨ *impliciete make regels* 59a ⟩ ≡
```
$(htmldir)/% : % $(htmldir)
        cp $< $(htmldir)/
```
◇
Fragment defined by 54c, 59a.
Fragment referenced in 51b.

Do the work:

⟨ *expliciete make regels* 59b ⟩ ≡
```
$(htmltarget) : $(htmlmaterial) $(htmldir)
        cd $(htmldir) && chmod 775 w2html
        cd $(htmldir) && ./w2html nlpp.w
```
◇
Fragment defined by 52bd, 53ab, 55a, 56d, 58c, 59b.
Fragment referenced in 51b.

Invoke:

⟨ *make targets* 59c ⟩ ≡
```
htm : $(htmldir) $(htmltarget)
```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.

Create a script that performs the translation.

"w2html" 59d≡
```
#!/bin/bash
# w2html -- make a html file from a nuweb file
# usage: w2html [filename]
#  [filename]: Name of the nuweb source file.
# 20170713 at 1812h: Generated by nuweb from a_nlpp.w
echo "translate " $1 >w2html.log
NUWEB=/home/huygen/projecten/pipelines/nlpp/env/bin/nuweb
```
⟨ *filenames in w2html* 60a ⟩

⟨ *perform the task of w2html* 59e ⟩

◇
Uses: nuweb 57d.

The script is very much like the `w2pdf` script, but at this moment I have still difficulties to compile the source smoothly into HTML and that is why I make a separate file and do not recycle parts from the other file. However, the file works similar.

⟨ *perform the task of w2html* 59e ⟩ ≡
⟨ *run the html processors until the aux file remains unchanged* 60b ⟩
⟨ *remove the copy of the aux file* 57c ⟩
◇
Fragment referenced in 59d.

The user provides the name of the nuweb file as argument. Strip the extension (e.g. `.w`) from the filename and create the names of the LaTeX file (ends with `.tex`), the auxiliary file (ends with `.aux`) and the copy of the auxiliary file (add `old.` as a prefix to the auxiliary filename).

⟨ *filenames in w2html* 60a ⟩ ≡
```
nufil=$1
trunk=${1%%.*}
texfil=${trunk}.tex
auxfil=${trunk}.aux
oldaux=old.${trunk}.aux
indexfil=${trunk}.idx
oldindexfil=old.${trunk}.idx
```
◇

Fragment referenced in 59d.
Defines: `auxfil` 57b, 58a, 60b, `nufil` 57bd, 60c, `oldaux` 57bc, 58a, 60b, `texfil` 57bd, 60c, `trunk` 57bd, 60cd.
Uses: `indexfil` 57b, `oldindexfil` 57b.

⟨ *run the html processors until the aux file remains unchanged* 60b ⟩ ≡
```
while
  ! cmp -s $auxfil $oldaux
do
  if [ -e $auxfil ]
  then
   cp $auxfil $oldaux
  fi
  ⟨ run the html processors 60c ⟩
done
⟨ run tex4ht 60d ⟩

```
◇

Fragment referenced in 59e.
Uses: `auxfil` 57b, 60a, `oldaux` 57b, 60a.

To work for HTML, nuweb *must* be run with the `-n` option, because there are no page numbers.

⟨ *run the html processors* 60c ⟩ ≡
```
$NUWEB -o -n $nufil
latex $texfil
makeindex $trunk
bibtex $trunk
htlatex $trunk
```
◇

Fragment referenced in 60b.
Uses: `bibtex` 57d, `makeindex` 57d, `nufil` 57b, 60a, `texfil` 57b, 60a, `trunk` 57b, 60a.

When the compilation has been satisfied, run makeindex in a special way, run bibtex again (I don't know why this is necessary) and then run htlatex another time.

⟨ *run tex4ht* 60d ⟩ ≡
```
tex '\def\filename{{nlpp}{idx}{4dx}{ind}} \input idxmake.4ht'
makeindex -o $trunk.ind $trunk.4dx
bibtex $trunk
htlatex $trunk
```
◇

Fragment referenced in 60b.
Uses: `bibtex` 57d, `makeindex` 57d, `trunk` 57b, 60a.

A.7 Perform the installation

Run nuweb, but suppress the creation of the LaTeX documentation. Nuweb creates only sources that do not yet exist or that have been modified. Therefore make does not have to check this. However, "make" has to create the directories for the sources if they do not yet exist. So, let's create the directories first.

⟨ *parameters in Makefile* 61a ⟩ ≡
```
MKDIR = mkdir -p
```
◇
Fragment defined by 51a, 52a, 54ab, 56c, 58b, 61a.
Fragment referenced in 51b.
Defines: MKDIR 61b.

⟨ *make targets* 61b ⟩ ≡
```
DIRS = ⟨ directories to create 8a, ... ⟩

$(DIRS) :
        $(MKDIR) $@
```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Defines: DIRS 61d.
Uses: MKDIR 61a.

⟨ *make scripts executable* 61c ⟩ ≡
```
chmod -R 775  ../bin/*
chmod -R 775  ../env/bin/*
```
◇
Fragment defined by 6o, 7c, 16a, 22g, 34a, 43b, 61c.
Fragment referenced in 61d.

The target "sources" unpacks the nuweb file and creates the program scripts, i.e. the scripts that will apply modules on a NAF file and the script `install_modules` that installs the modules themselves and that creates the software environment the the modules need.

⟨ *make targets* 61d ⟩ ≡
```
sources : nlpp.w $(DIRS) $(NUWEB)
        $(NUWEB) nlpp.w
        ⟨ make scripts executable 6o, ... ⟩
```
◇
Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Uses: DIRS 61b.

The "install" target performs the complete installation.

⟨ *make targets* 62a ⟩ ≡

```
install : sources
        ../env/bin/make_infrastructure
        ../env/bin/install_modules
```

◇

Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Defines: `install` 7d, 12a, 13b, 14b, 15a, 17a, 18ag, 27de, 28a, 29c, 32b, 34b, 51e, 62b.

A.8 Test whether it works

The targets testnl and testen perform the test-script to test the dutch resp. english pipeline.

⟨ *make targets* 62b ⟩ ≡

```
testnl : install test.nl.in.naf
        rm -rf ../test
        mkdir ../test
        cd ../test && ../bin/test nl

testen : install test.en.in.naf
        rm -rf ../test
        mkdir ../test
        cd ../test && ../bin/test en
```

◇

Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.
Defines: `testen` Never used, `testnl` Never used.
Uses: `install` 62a.

A.9 Restore paths after transplantation

When an existing installation has been transplanted to another location, many path indications have to be adapted to the new situation. The scripts that are generated by nuweb can be repaired by re-running nuweb. After that, configuration files of some modules must be modified.

⟨ *make targets* 62c ⟩ ≡

```
transplant :
        touch a_nlpp.w
        $(MAKE) sources
        ../env/bin/transplant
```

◇

Fragment defined by 51d, 55b, 56a, 59c, 61bd, 62abc.
Fragment referenced in 51b.

B References

B.1 Literature

References

[1] Rodrigo Agerri, Itziar Aldabe, Zuhaitz Beloki, Egoitz Laparra1, Maddalen Lopez de Lacalle1, German Rigau, Aitor Soroa, Antske Fokkens, Ruben Izquierdo, Marieke van Erp, Piek Vossen, Christian Girardi, and Anne-Lyse Minard. Event detection, version 2, deliverable d4.2.2. Technical report, University of the Basque Country, IXA NLP group, feb 2015. http://www.newsreader-project.eu/files/2012/12/NWR-D4-2-2.pdf.

[2] Donald E. Knuth. Literate programming. Technical report STAN-CS-83-981, Stanford University, Department of Computer Science, 1983.

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