INTRODUCTION TO IE AND ANNIE

Ye Jiang and Mehmet Bakir

The Session will be recorded. The records will be available after the training

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ABOUT THIS TUTORIAL

This part of the tutorial comprises the following topics:

1. Introduction to Information Extraction (IE)
2. A Closer look at ANNIE
3. Evaluation and Corpus Quality Assurance

INFORMATION EXTRACTION (IE)

Information extraction (**IE**) is the task of automatically extracting structured information from unstructured and/or semi-structured machine-readable documents and other electronically represented sources*.

https://en.wikipedia.org/wiki/Information_extraction

NAMED ENTITY RECOGNITION (NER): THE CORNERSTONE OF IE

Traditionally, **NER is the identification of proper names in texts**, and their classification into a set of predefined categories of interest

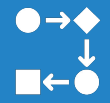
- Person
- Organisation (companies, government organisations, committees, etc.)
- Location (cities, countries, rivers, etc.)
- Date and time expressions

Various other types are frequently added, as appropriate to the application, e.g., newspapers, ships, monetary amounts, percentages.

WHY IS NE IMPORTANT?

- **NE provides a foundation** from which to build more complex IE systems
- Relations between NEs can provide tracking, ontological information and scenario building
  - Tracking (co-reference): “Dr Smith”, “John Smith”, “John”, “he”
  - Ontologies: “Athens, Georgia” vs “Athens, Greece”

TYPICAL NE PIPELINE



Pre-processing (tokenisation, sentence splitting, morphological analysis, POS tagging)

Entity finding (gazetteer lookup, NE grammars)

Coreference (alias finding, orthographic coreference etc.)

Exporting to database / XML / ontology

EXAMPLE OF IE - UNSTRUCTURED TEXT

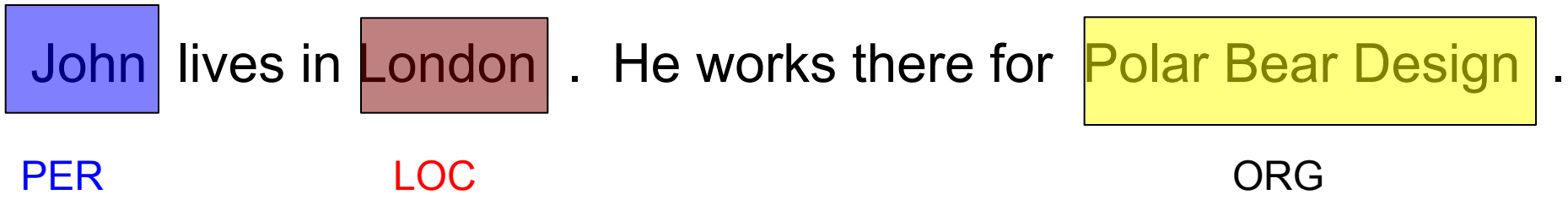
John lives in London. He works there for Polar Bear Design.

EXAMPLE OF IE - TOKENIZE

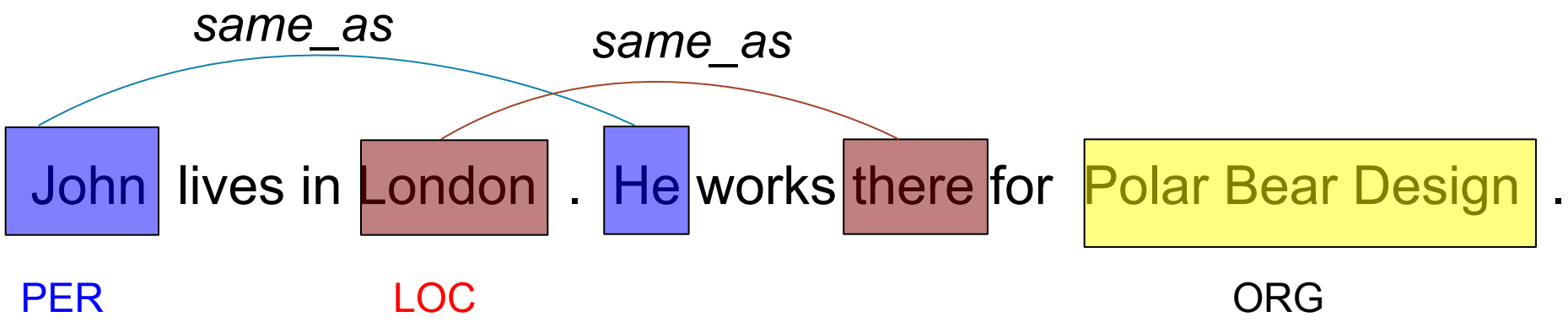
John lives in London . He works there for Polar Bear Design .

BASIC NE RECOGNITION

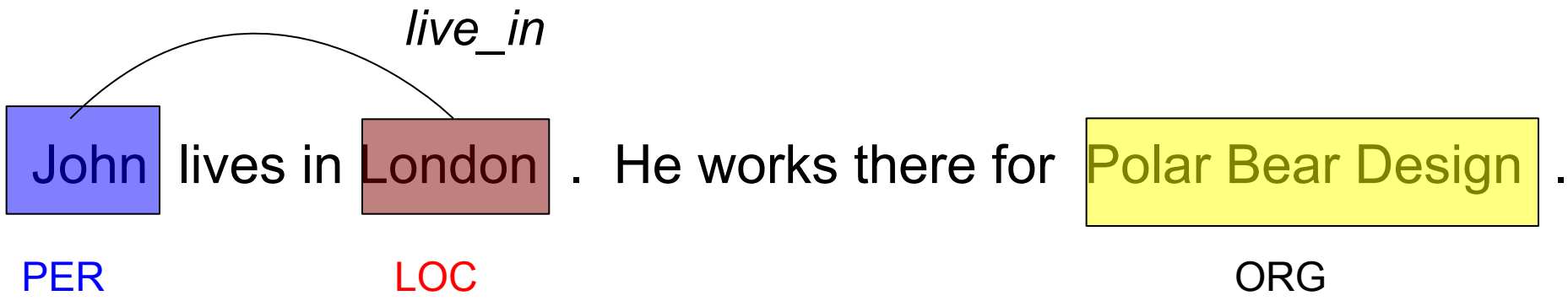
Process gazetteer and grammar rules...



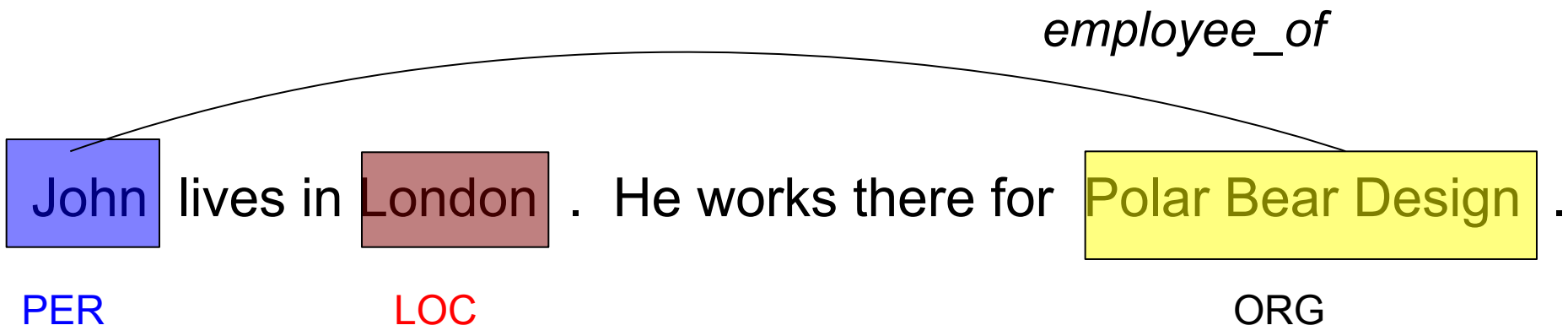
CO-REFERENCE



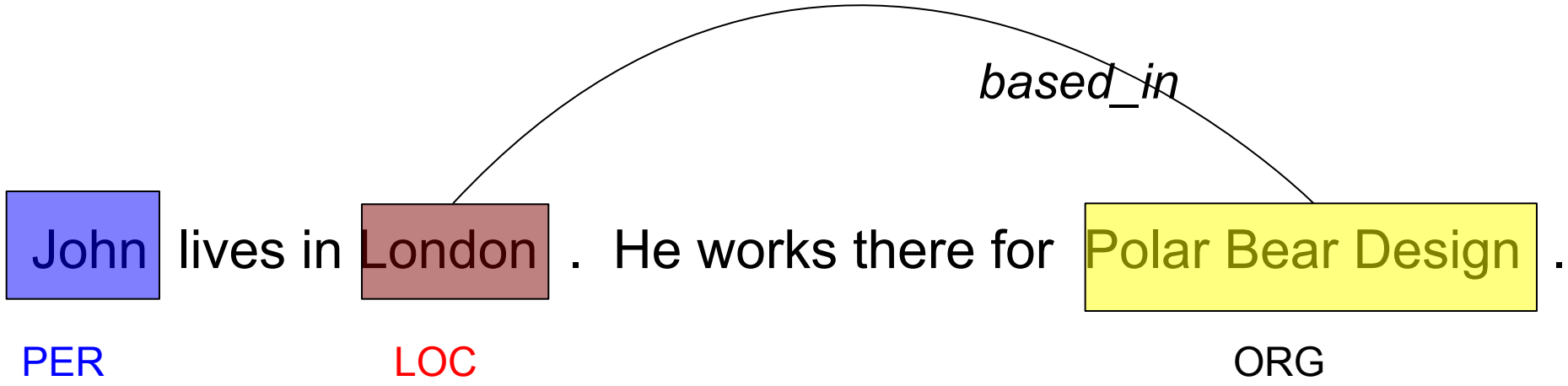
RELATIONS


live_in
John
lives in
London
. He works there for
Polar Bear Design
.
PER
LOC
ORG

RELATIONS (2)


employee_of
John
lives in
London
. He works there for
Polar Bear Design
.
PER
LOC
ORG

RELATIONS (3)


based_in
John
lives in
London
. He works there for
Polar Bear Design
.
PER
LOC
ORG

A CLOSER LOOK AT ANNIE(A NEARLY NEW INFORMATION EXTRACTION SYSTEM)

ABOUT THIS PART

- This part of the tutorial will look have a closer look at ANNIE and its components.
- We will create our own ANNIE-like application.
- As before, this tutorial will be a hands-on session with some explanation as you go.
  - We will use a corpus of news texts in the file annie-hands-on.zip[1]. Unzip this file if it isn't already.
  - Things for you to try yourself are in red.

1 http://gate.ac.uk/sale/talks/gate-course-jun19/module-1-ie-and-eval/annie-hands-on.zip

WHAT'S IN ANNIE?

ANNIE is a ready made collection of PRs that extract information from unstructured text.

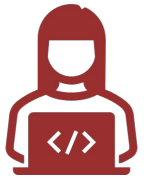
ANNIE contains a set of core PRs which forms a pipeline which consists of:

- Tokeniser
- Sentence Splitter
- POS tagger
- Gazetteers
- Named entity tagger (JAPE transducer)
- Orthomatcher (orthographic coreference)

There are also other useful PRs, which are not used in the default application, but can be added if necessary, e.g.

- NP chunker (in the Tagger:NP Chunking plugin)
- ANNIE VP Chunker (in the Tools plugin)

LOADING AND RUNNING ANNIE



Because ANNIE is a ready-made application, we can just load it directly from the menu.

- **Click the**  **icon** from the top GATE menu.

  OR

  File →Ready Made Applications →ANNIE →ANNIE

  OR

  right-click ***Applications →Ready Made Applications →ANNIE →ANNIE***

- Create a new corpus and Populate it from the "**news-texts**" director.
- **Run ANNIE** and inspect the annotations.
- You should see a mixture of Named Entity annotations (Person, Location etc.) and some other linguistic annotations (Token, Sentence etc.).

LET'S LOOK AT THE PRs

Each PR in the ANNIE pipeline **creates some new annotations or modifies** existing ones.

Document Reset → removes annotations.

Tokeniser → **Token** annotations.

Gazetteer → **Lookup** annotations.

Sentence Splitter → **Sentence, Split** annotations.

POS tagger → adds **category** features to **Token** annotations.

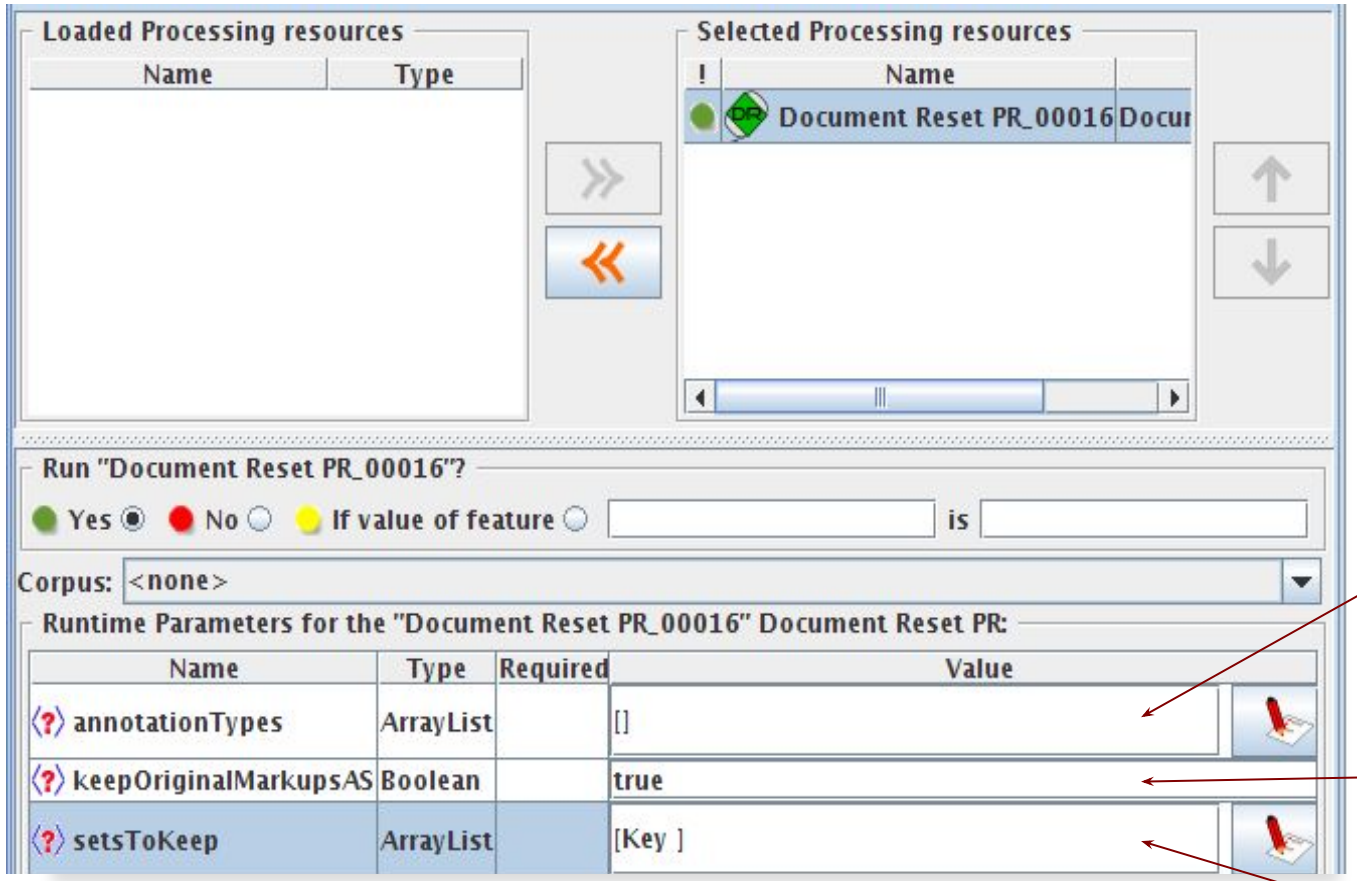
NE transducer → **Date, Person, Location, Organisation, Money, Percent** annotations.

Orthomatcher → adds **match** features to NE annotations.

DOCUMENT RESET

- This PR **should go at the beginning** of (almost) every application you create.
- It **removes annotations created previously**, to prevent duplication if you run an application more than once.
- It **does not remove the Original markup** set, by default.
- By default it also **keeps the "Key"** set (by convention the set used for evaluation).
- You can configure it to keep any other annotation sets you want, or to remove particular annotation types only.

DOCUMENT RESET PARAMETERS



Specify any specific annotations to remove. By default, remove all.

Keep Original Markups set

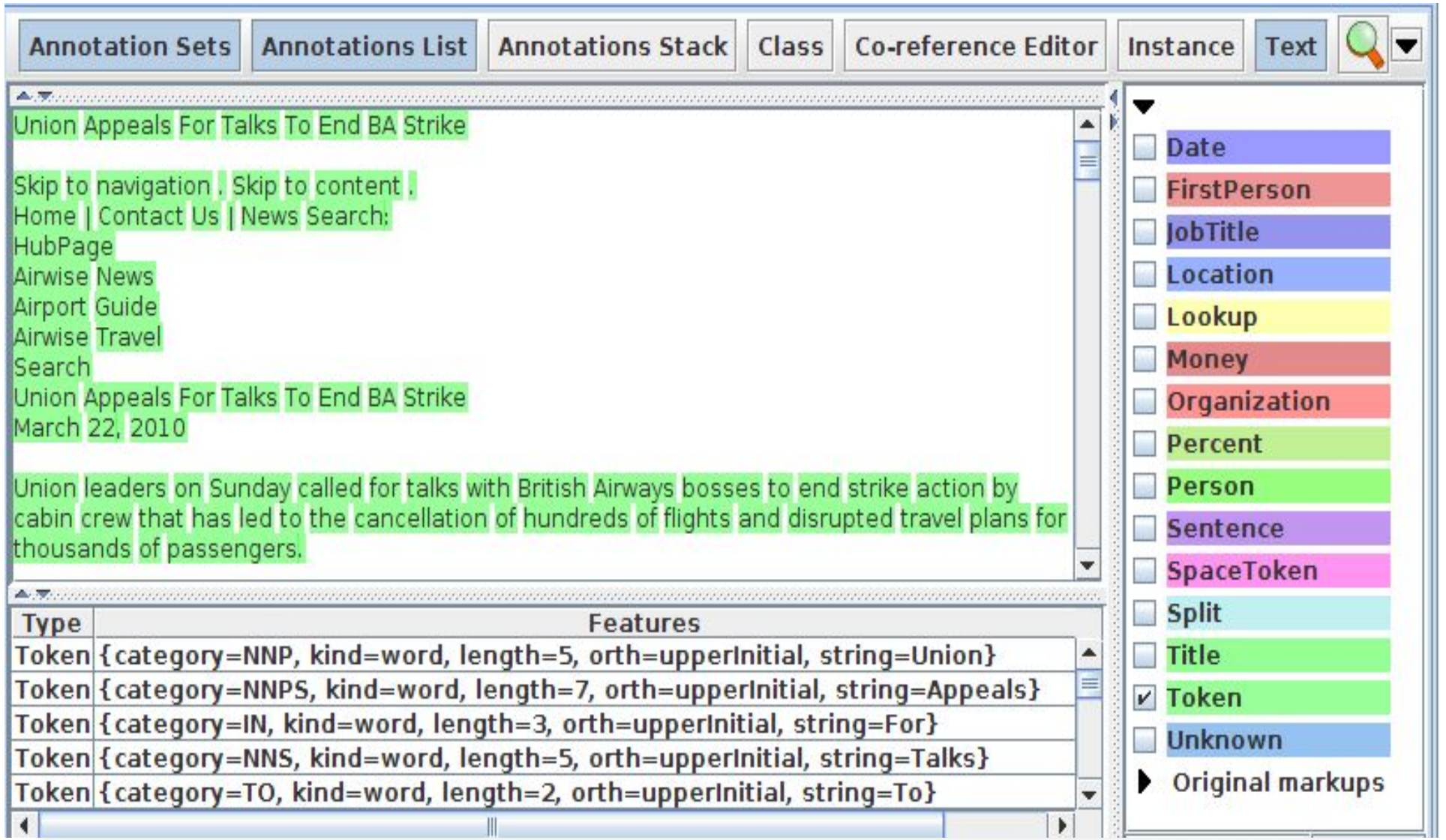
Keep Key set

TOKENISER

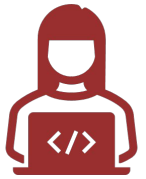
Splits the text into very simple tokens such as numbers, punctuation and words of different types.

- Produces **Token** and **SpaceToken** annotations with **kind, orthography, length** and **string** features.
- **kind** can be:
  - word, number, symbol or punctuation.
- **orth** (**orthography)** can be:
  - upperInitial - initial letter is uppercase, rest are lowercase
  - allCaps - all uppercase letters
  - lowerCase - all lowercase letters
  - mixedCaps - any mixture of upper and lowercase letters not in the above categories
- **length:** number of chars in the token
- **string:** text of the token

DOCUMENT WITH TOKENS

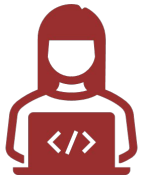


LOOKING AT TOKENS



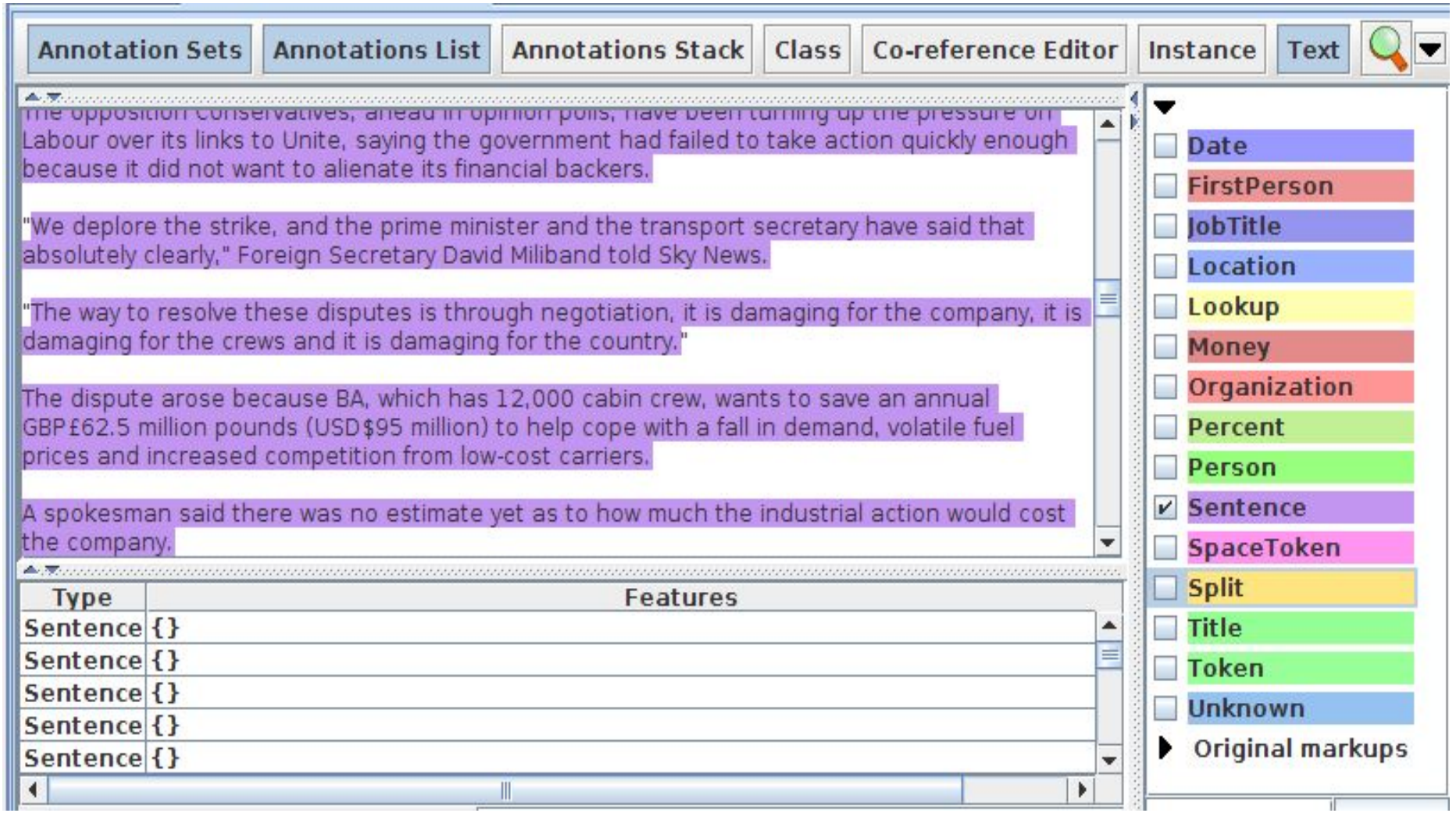
1. **Tidy up GATE by removing all resources** and applications (or just restart GATE)
2. **Load the news text** hands-on corpus
3. **Create a new application** (corpus pipeline)
4. Load a **Document Reset** and an **ANNIE English Tokeniser**
5. **Add them (in that order)** to the application and run on the corpus
6. **View the Token** and **SpaceToken** annotations
7. What different values of the **“kind”** feature do you see?

SENTENCE SPLITTER



- The default splitter finds sentences based on Tokens.
- Creates **Sentence** annotations and **Split** annotations on the sentence delimiters.
- Uses a gazetteer of abbreviations etc. and a set of JAPE grammars (you will learn in module 2) which find sentence delimiters and then annotate sentences and splits.
- Load an **ANNIE Sentence Splitter PR** and add it to your application (**at the end**)
- **Run the application** and view the results

DOCUMENT WITH SENTENCES



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PART-OF-SPEECH (POS) TAGGER

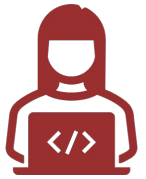
- ANNIE POS tagger is a Java implementation of Brill's transformation based tagger
- Trained on The Wall Street Journal, uses Penn Treebank tagset*.
- Adds **category** feature to **Token** annotations
- Requires **Tokeniser** and **Sentence Splitter to be run first**

* https://www.ling.upenn.edu/courses/Fall_2003/ling001/penn_treebank_pos.html

JJ	Adjective
JJR	Adjective, comparative
JJS	Adjective, superlative
LS	List item marker
MD	Modal
NN	Noun, singular or mass
NNS	Noun, plural
NNP	Proper noun, singular
NNPS	Proper noun, plural
PDT	Predeterminer
POS	Possessive ending
PRP	Personal pronoun
PRP$	Possessive pronoun
RB	Adverb
RBR	Adverb, comparative
RBS	Adverb, superlative
RP	Particle
SYM	Symbol
TO	*to*
UH	Interjection
VB	Verb, base form
VBD	Verb, past tense
VBG	Verb, gerund or present participle
VBN	Verb, past participle

MORPHOLOGICAL ANALYSER

- Not an integral part of ANNIE, but **can be found in the Tools plugin** as an “added extra”
- Generates **root** feature on **Token** annotations
- **Requires Tokeniser** to be run first
- Requires **POS tagger to be run first if the considerPOSTag** parameter is set to true



- Add an **ANNIE POS Tagger** to your app.
- Add a **GATE Morphological Analyser** after the POS Tagger (If this PR is not available, **load the Tools plugin** first).
- **Re-run** your application.
- **Examine the features** of the **Token** annotations.
- New features of **category** and **root** have been added.

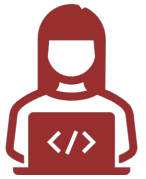
Gazetteers

GAZETTEERS

Gazetteers are plain text files containing lists of names (e.g. cities, rivers, people, …). These lists are used to find occurrences of these names in text.

- The ANNIE gazetteer has about 60,000 entries arranged in 80 lists.
- Each list reflects a certain category, e.g. airports, cities, first names etc.
- List entries might be entities or parts of entities, or they may contain contextual information (e.g. job titles often indicate people).
- Each gazetteer has an index file listing all the lists, plus features of each list (**majorType**, **minorType**, and **language**).
- Gazetteers generate **Lookup** annotations with relevant features corresponding to the list matched.
- Lookup annotations are used primarily by the NE transducer.
- Lists can be modified either internally using the Gazetteer Editor, or externally in your favourite editor.

RUNNING THE ANNIE GAZETTEER

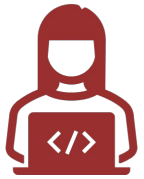


Different kinds of gazetteer are available.

Here, we'll look at the **default ANNIE gazetteer.**

- **Add the ANNIE Gazetteer** PR to the end of your pipeline
- **Re-run the pipeline**
- Look for "**Lookup**" annotations and examine their features

ANNIE GAZETTEER - CONTENTS



- **Double click on the ANNIE Gazetteer** PR (under Processing Resources in the left hand pane) to open it.
- Make sure **"Gazetteer Editor" is selected** from the bottom tab.
- In the left hand pane (linear definition) you see the index file containing **all the lists.**
- In the right hand pane you see **the contents of the list** selected in the left hand pane.
- **The entries are read-only.**
- To edit ANNIE resources, we first need to **make a copy of them** that we can change.

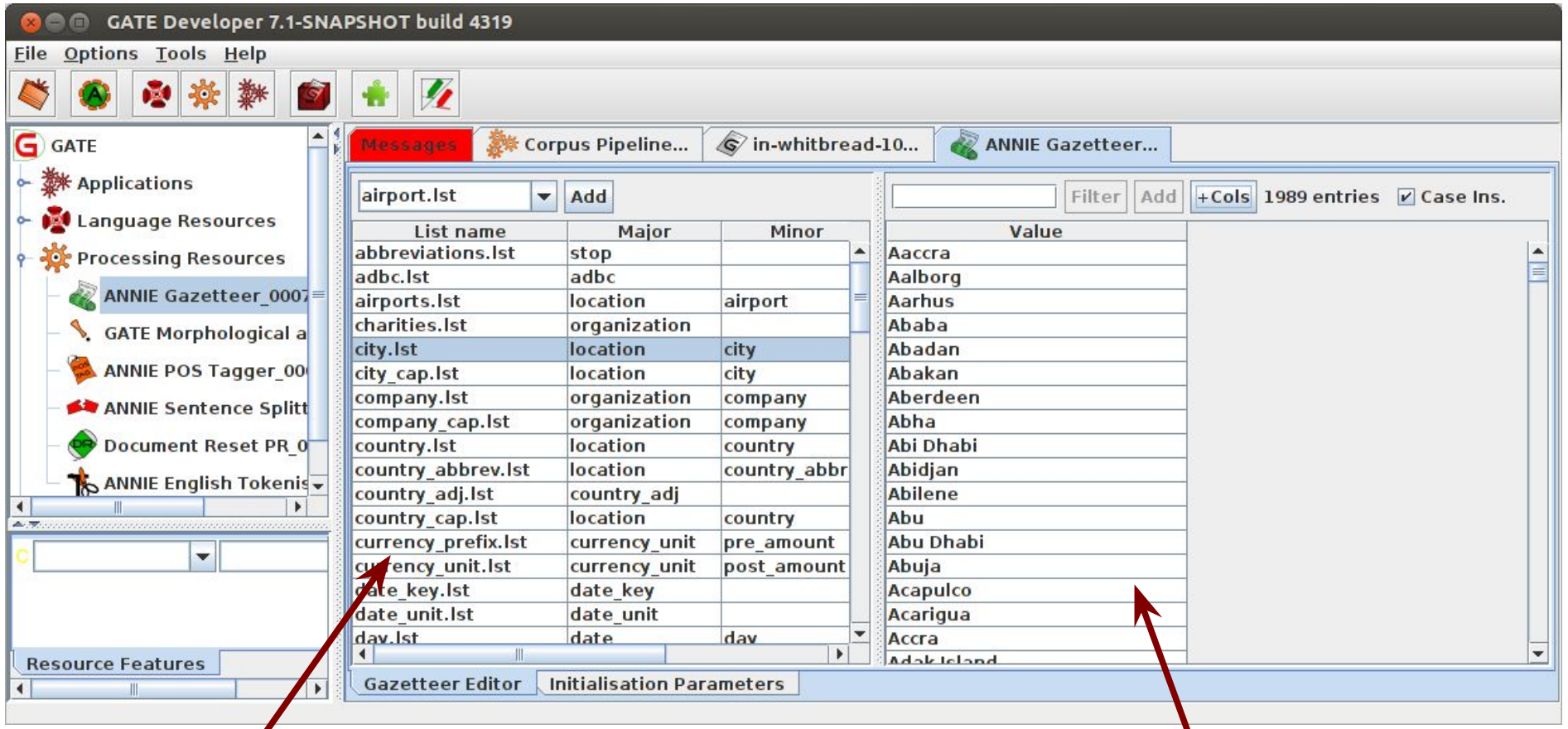
EDITING ANNIE GAZETTEER CONTENTS

1. **Close *ANNIE Gazetteer*** from PRs.
2. If you didn't download ANNIE before, go to the plugin manager and **select *Annie*, click the download button**  and **save it to a local folder.**
3. **Right-click PR** and **select *ANNIE Gazetteer*.**
4. Click the ***listsURL*** browse button 
5. Select the **file** tab, go to the location you downloaded *ANNIE*, go to the ***gazetteer* directory** and select **lists.def** and click OK.
6. Double click **ANNIE Gazetteer** in PR.

Now **each entry can be edited** by clicking in the box and typing.

New entries can be added by typing in the "**New list**" or "**New entry**" box respectively.

GAZETTEER EDITOR



definition file entries

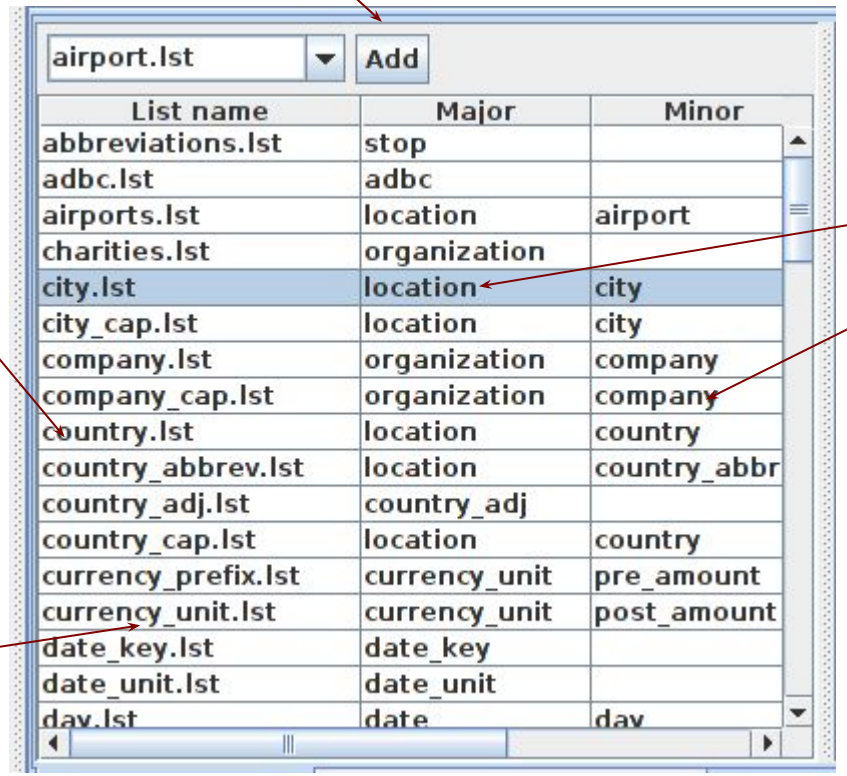
entries for selected list

MODIFYING THE DEFINITION FILE

add a new list

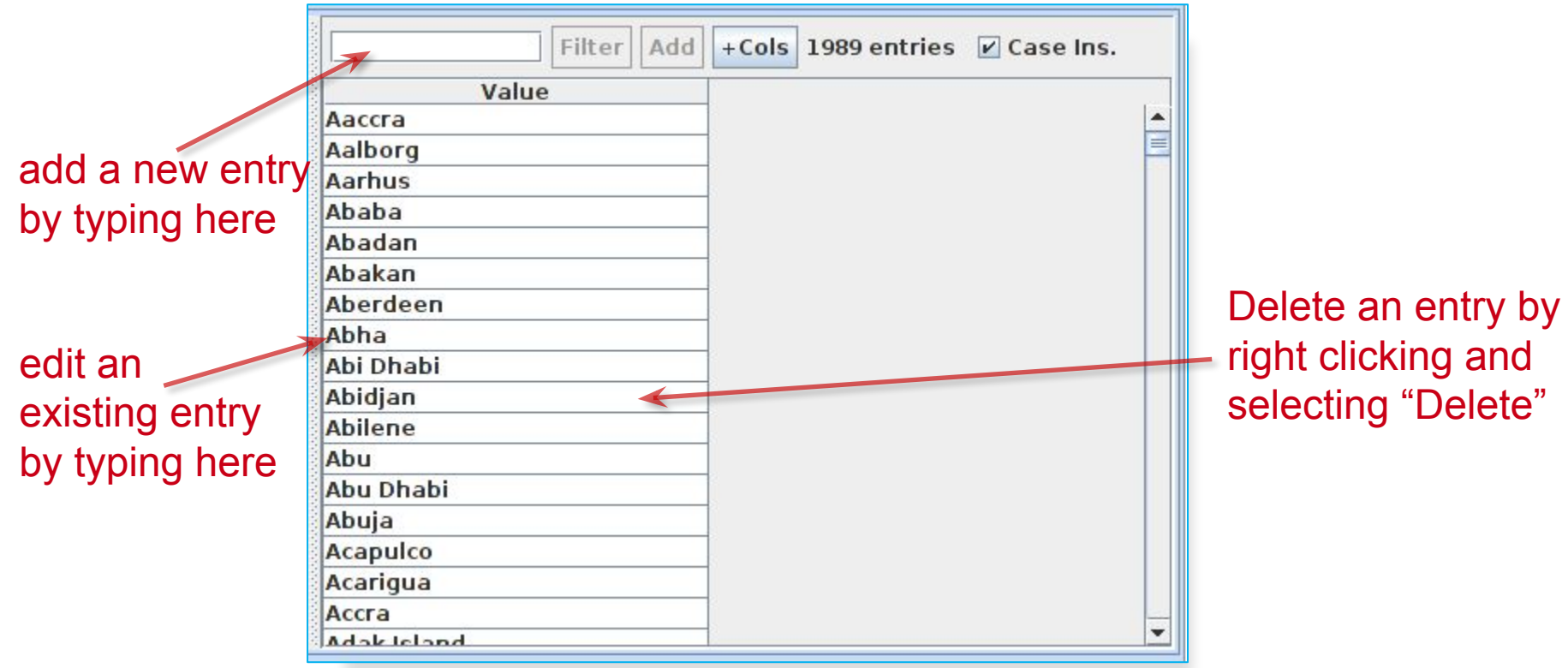
edit an existing list name by typing here

delete a list by right clicking on an entry and selecting '*Delete*'

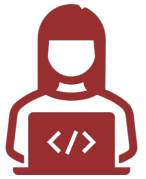


edit the major and minor Types by typing here

MODIFYING A LIST



EDITING GAZETTEER LISTS



- Click on any list to see the entries.
- Note that some lists are not very complete!
- **Try adding, deleting and editing** existing lists, or the list definition file.
- To save an edited gazetteer, **use *Ctrl-S* shortcut** or right click on the gazetteer name in the tabs at the top or in the resources pane on the right, and select "**Save and Reinitialise**" before running the gazetteer again.
- **Try adding a new word** from a document you have loaded (that is not currently recognised as a Lookup) into the gazetteer, re-run the gazetteer and check the results.

EDITING GAZETTEERS OUTSIDE GATE

- You can also edit both the definition file and the lists outside GATE, in a text editor
- If you choose this option, **you will need to reinitialise the gazetteer** in GATE before running it again
- **To reinitialise** any PR, **right click on its name** in the Resources pane and **select "Reinitialise"**

LIST ATTRIBUTES

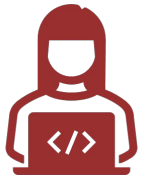
When something in the text matches a gazetteer entry, a **Lookup** annotation is created, with various features and values.

- The ANNIE gazetteer has the following default feature types: **majorType**, **minorType**, **language**.
- For example, the “city” list has a majorType “location” and minorType “city”, while the “country” list has “location” and “country” as its types.
- Later, in the JAPE grammars, we can refer to all Lookups of type location, or we can be more specific and refer just to those of type “city” or type “country”.

NE TRANSDUCER

- Gazetteers can be used to find terms that suggest entities.
- However, the entries can often be ambiguous.
  - “May Jones” vs “May 2010” vs “May I be excused?”
  - “Mr Parkinson” vs “Parkinson's Disease”.
  - “General Motors” vs. “General Smith”.
- Hand-crafted grammars can be used to **define patterns over the Lookups and other annotations**.
- These patterns can help disambiguate, and they can combine different annotations, e.g. Dates can be comprised of {day} + {number} + {month} Lookup annotations.
- NE transducer consists of a number of grammars **written in the JAPE language.** Module-2 will be **devoted to JAPE**.

ANNIE NE TRANSDUCER



- **Load an ANNIE NE Transducer** PR
- **Add it to the end** of the application
- **Run the application**
- **Look at the annotations**
- You should see some new annotations such as **Person**, **Location**, **Date** etc.
- These will have features showing more specific information (e.g. what kind of location it is) and the rules that were fired (for ease of debugging)

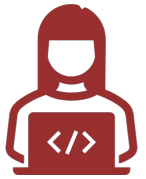
USING CO-REFERENCE

- Different expressions may refer to the same entity.
- Orthographic co-reference module (orthomatcher) matches proper names and their variants in a document.
- [*Mr Smith*] and [*John Smith*] will be matched as the same person.
- [*International Business Machines Ltd.*] will match [*IBM*].

ORTHOMATCHER PR

- Performs co-reference resolution based on orthographical information of entities
- Produces a list of annotation IDs that form a **co-reference "chain"**
- List of such lists stored as **a document feature** named **"MatchesAnnots"**
- Improves results by assigning entity type to previously unclassified names, based on relations with classified entities
- Classification of unknown entities very useful for surnames which match a full name, or abbreviations,
  e.g. "Bonfield" **<Unknown>** will match "Sir Peter Bonfield" **<Person>**

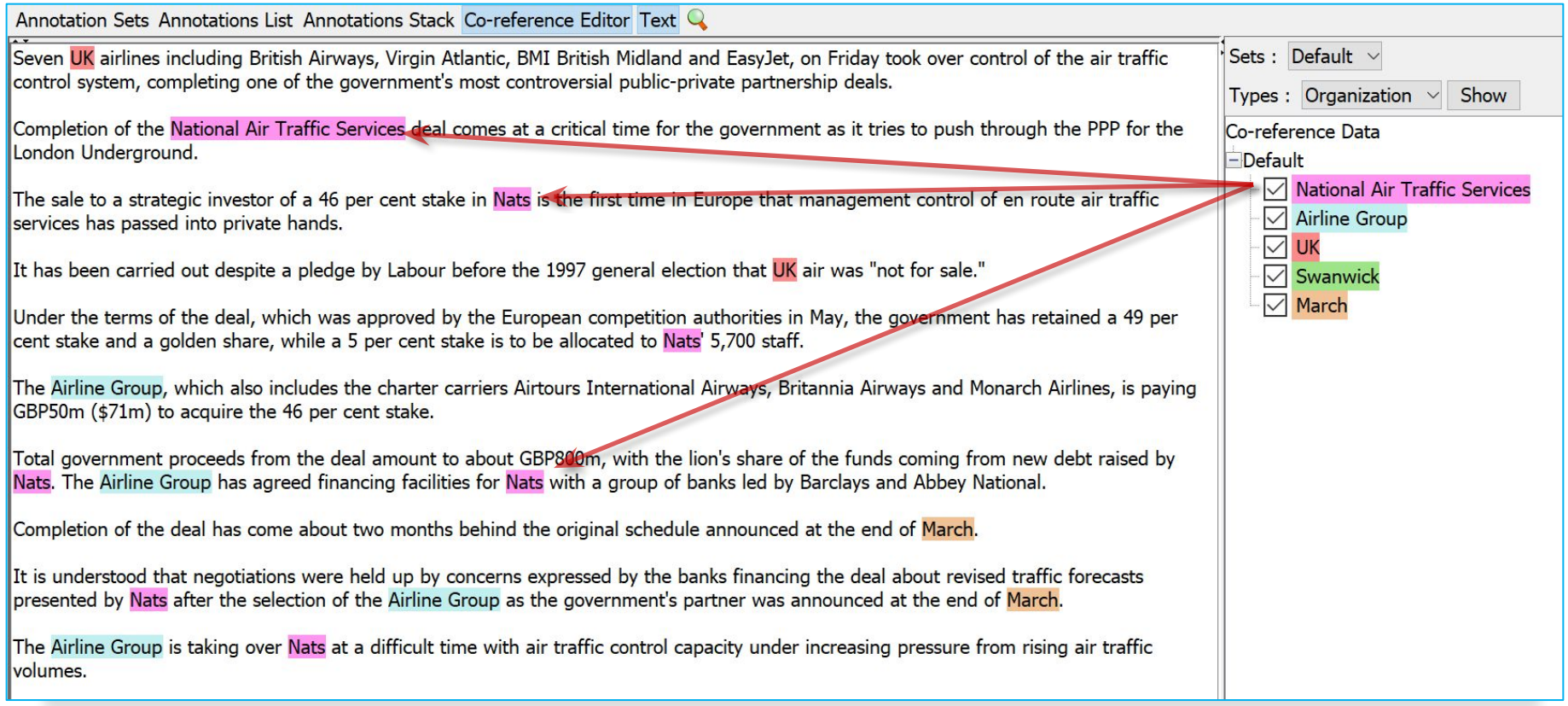
LOOKING AT CO-REFERENCE



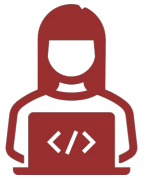
- Add a new PR: **ANNIE OrthoMatcher**.
- Add it **to the end** of the application.
- **Run** the application.
- In a document view, **open the co-reference editor** by clicking the button above the text.

All the documents in the corpus should have some co-reference, but some may have more than others.

CO-REFERENCE EDITOR



USING THE CO-REFERENCE EDITOR



- **Select the annotation set** you wish to view (select Default set for now)
- A list of all the co-reference chains that are based on annotations in the currently selected set is displayed
- **Select an item in the list** to highlight all the member annotations of that chain in the text (you can select more than one at once)
- **Hovering over** a highlighted annotation in the text **enables you to delete** an item from the co-reference chain
- Try it!

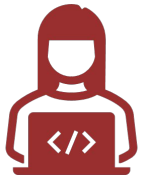
EVALUATION

“We didn’t underperform. You over expected.”

INTRODUCTION TO EVALUATION

- Evaluation of NLP tools is very important because we need to know how well our tools are performing.
  - Is it actually worth developing an automatic tool to perform a task?
- Especially in GATE, there is often a choice of which tool to use for a job (e.g. multiple parsers) so we might want to know which one is best.
- We need to know whether changes we make to the tools will improve or harm our system: e.g. making components case-insensitive might improve Recall but harm Precision
- We will look at what evaluation metrics to use for NLP, and some tools to perform evaluation.

EVALUATION EXERCISES: PREPARATION



- Restart GATE, or **close all documents** and PRs to tidy up
- **Load the annie-hands-on/news-texts** into a corpus
- Take a **look at the annotations.**
- There is an annotation set called "**Key**". This is a set of annotations against which we want to evaluate ANNIE. In practice, **they can be created by human annotators, or by another application.**
- **Load ANNIE and run it**
- **You should have annotations in the Default set from ANNIE, and in the Key set, against which we can compare them.**

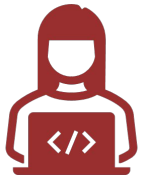
ANNOTATION DIFF

- Graphical comparison of 2 sets of annotations
- Visual diff representation, like tkdiff
- Compares one document at a time, one annotation type at a time

Annotations are like squirrels…

Annotation Diff helps with “spot the difference”

ANNOTATION DIFF EXERCISE

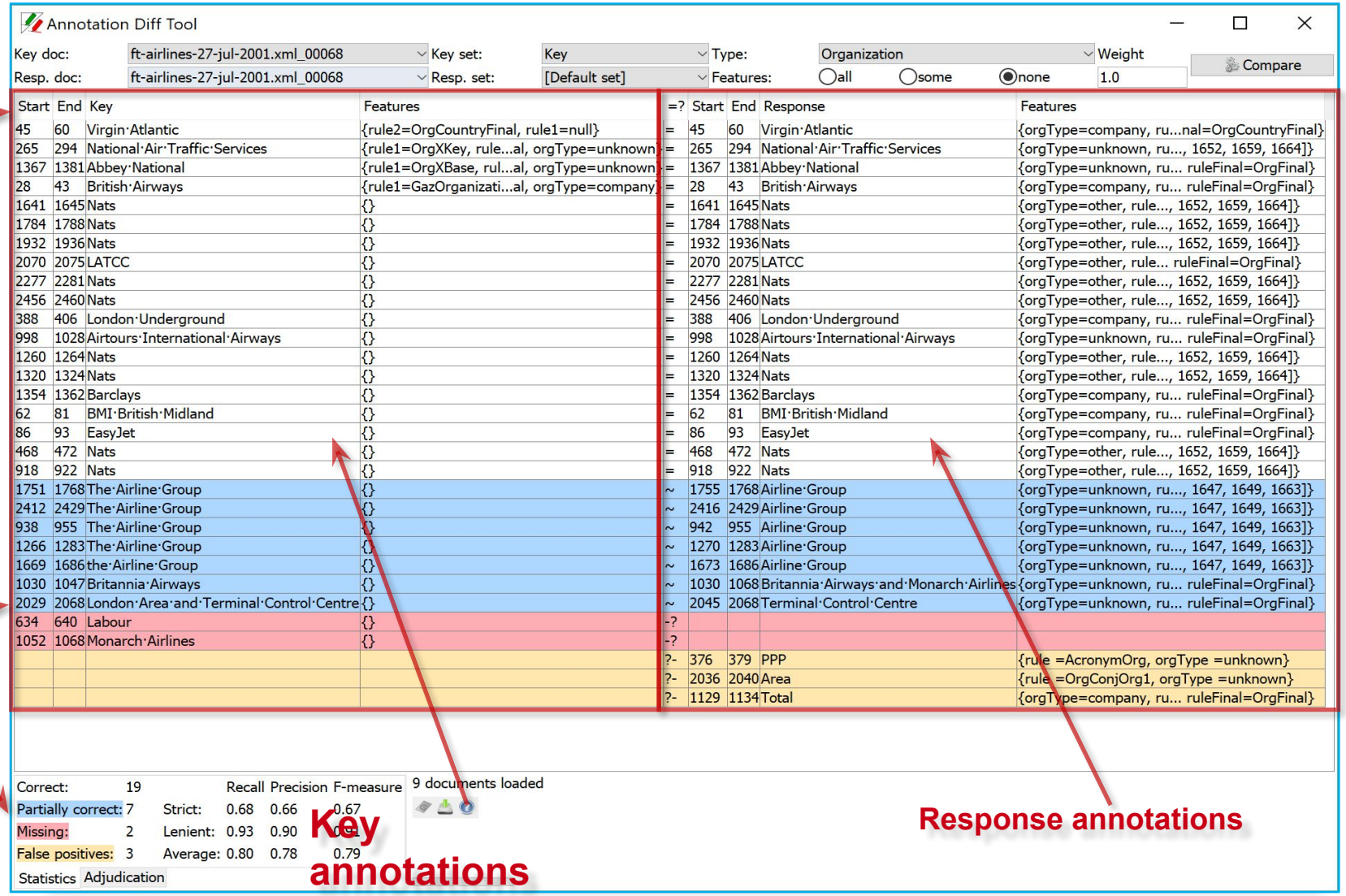


- Open the document "**ft-airlines-27-jul-2001.xml**"
- Open the ***Annotation Diff*** (Tools → Annotation Diff or **click icon** 
- For the **Key** set (may contain the manual annotations) select **Key** annotation set
- For the **Response** set (containing annotations from ANNIE) select the **Default** annotation set
- For the **Type** option select the **Organization** annotation.
- Click on "Compare"
- Scroll down the list, to see correct, partially correct, missing and false positive annotations

COMPARING THE ANNOTATIONS

You can sort the columns however you like.

colour codes indicate whether the annotation pair shown are correct, partially correct, missing (false negative) or false positive.



MEASURING SUCCESS

In IE, we classify the annotations produced in one of 4 ways:

Correct = things annotated correctly

e.g. annotating “Sheffield” as a Location

Missing = things not annotated that should have been

e.g. not annotating “Sheffield” as a Location

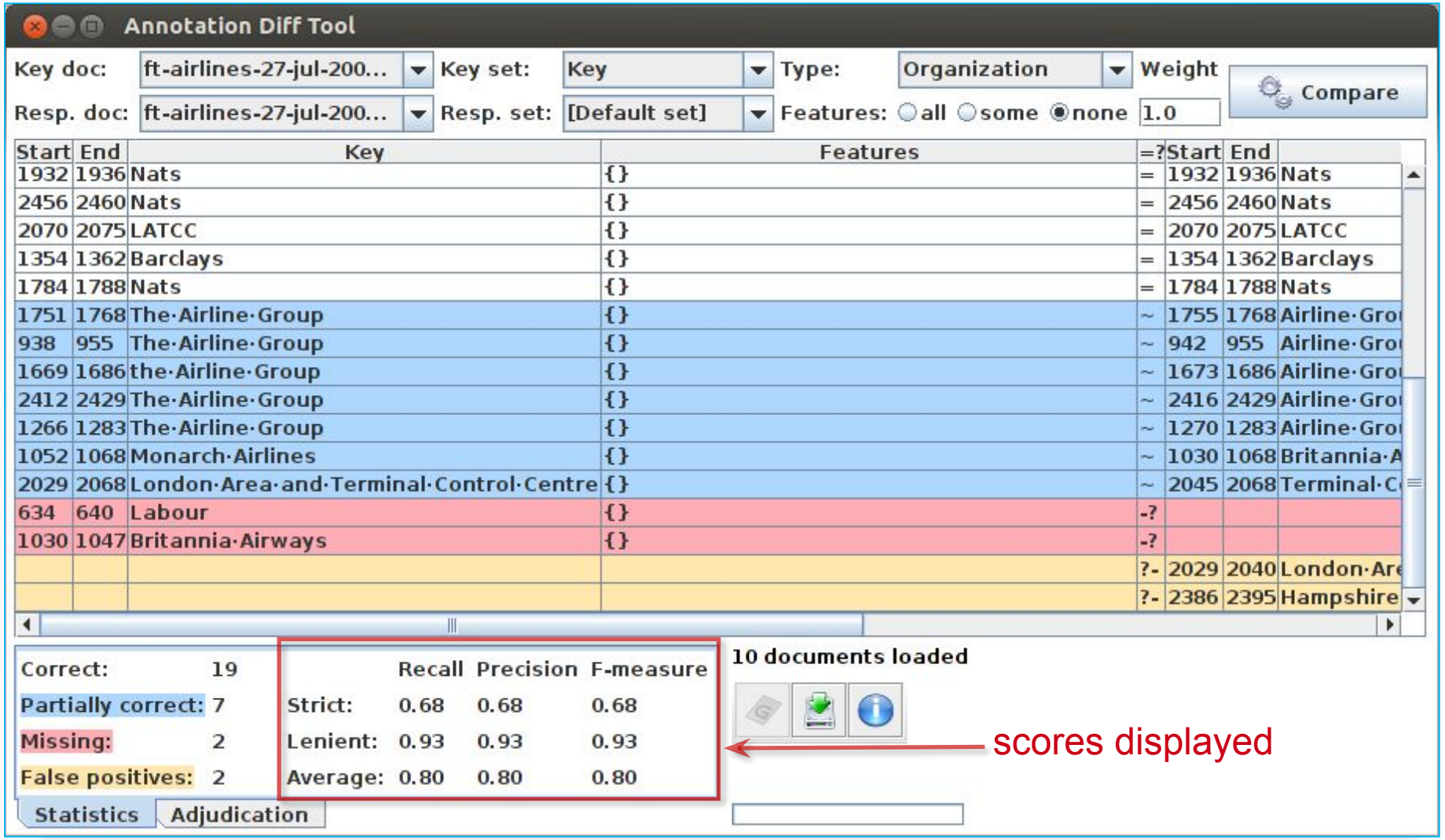
False positive = things annotated wrongly

e.g. annotating “Sheffield United F.C.” as a Location.

Partially correct = the annotation type is correct, but the span is wrong

e.g. annotating just “Trump” as a Person (too short) or annotating “Unfortunately Donald Trump” as a Person (too long)

FINDING PRECISION, RECALL AND F-MEASURE



Precision

Correct = things annotated correctly

Missing = things not annotated that should have been

False positive = things annotated wrongly

- How many of the entities your application found were correct?

$$Precision = \frac{Correct}{Correct + \textbf{False positive}}$$

Recall

Correct = things annotated correctly

Missing = things not annotated that should have been

False positive = things annotated wrongly

- How many of the entities that exist did your application find?
- Sometimes recall is called **coverage**

$$Recall = \frac{Correct}{Correct + Missing}$$

F-MEASURE

Precision and recall tend to **trade off against one another**.

* If you specify your rules precisely to improve precision, you may get a lower recall.
* If you make your rules very general, you get good recall, but low precision.

This makes it difficult to compare applications, or to check whether a change has improved or worsened the results overall.

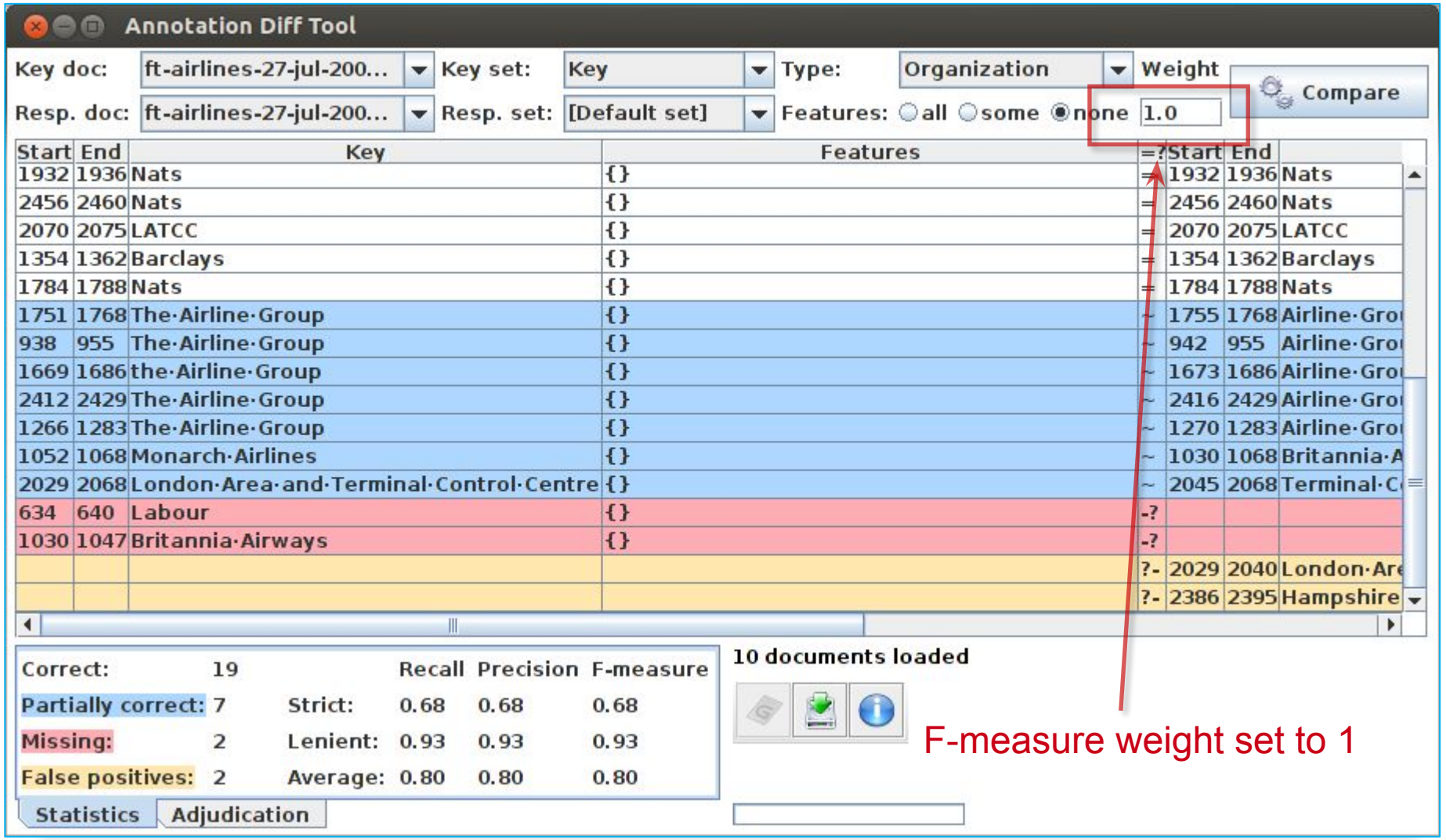
F-measure combines precision and recall into one measure.

F-MEASURE

- Also known as the “harmonic mean”.
- Usually, precision and recall are equally weighted.
- This is known as **F1**.
- To use F1, set the value of the F-measure weight to 1, this is the default setting in Annotation Diff tool.

$$F = 2 \cdot \left(\frac{precision \cdot recall}{precision + recall} \right)$$

ANNOTATION DIFF DEFAULTS TO F1



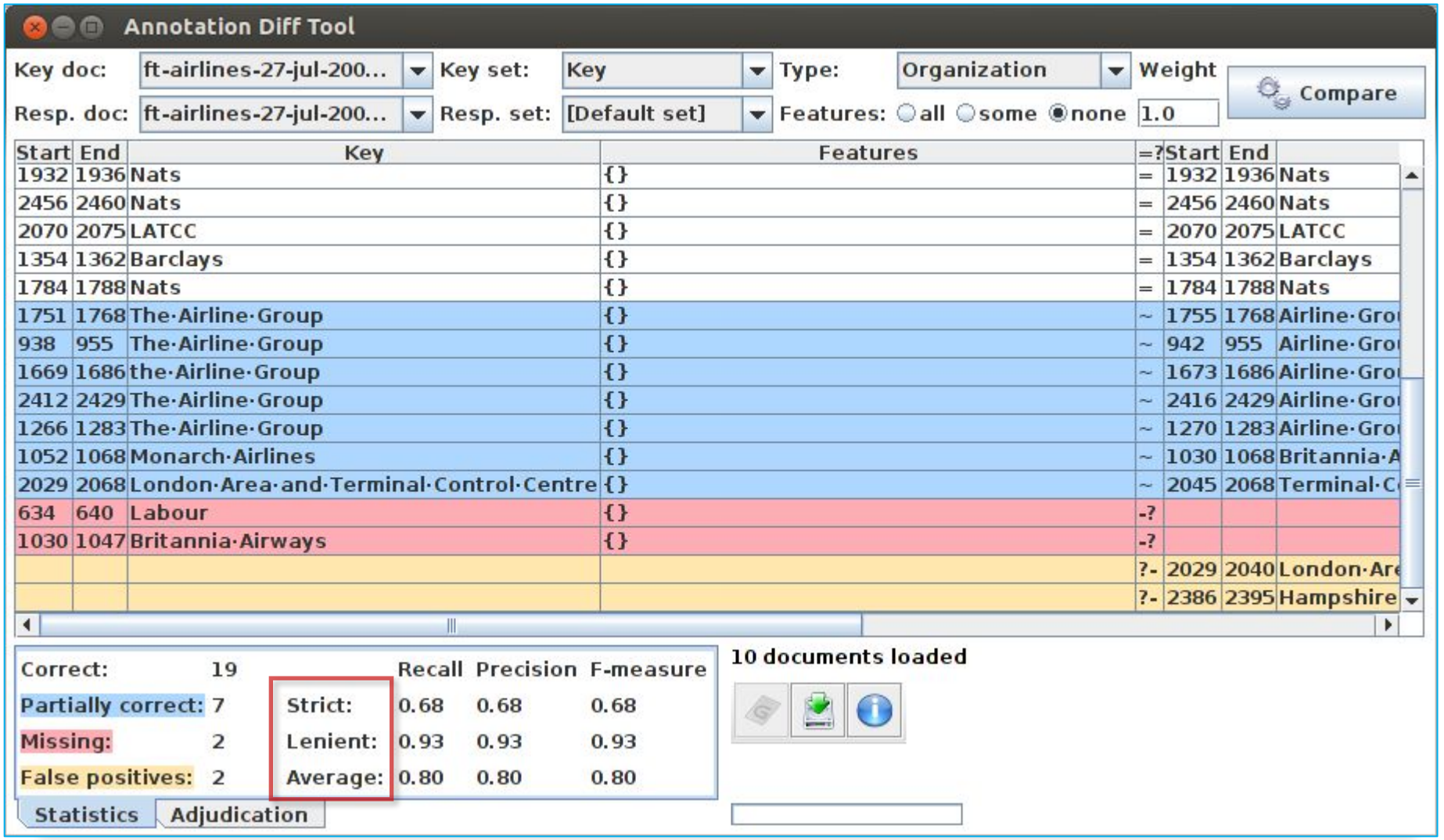
STATISTICS CAN MEAN WHAT YOU WANT THEM TO....

How we want **to measure partially correct annotations** may differ, depending on our goal.

In GATE, there are **3 different ways** to measure them

- The most usual way is to consider them to be "**half right**".
- **Strict:** Only perfectly matching annotations are counted as correct.
- **Lenient:** Partially matching annotations are counted as correct. This makes your scores look better :))
- **Average:** Strict and lenient scores are averaged (this is the same as counting a half weight for every partially correct annotation).

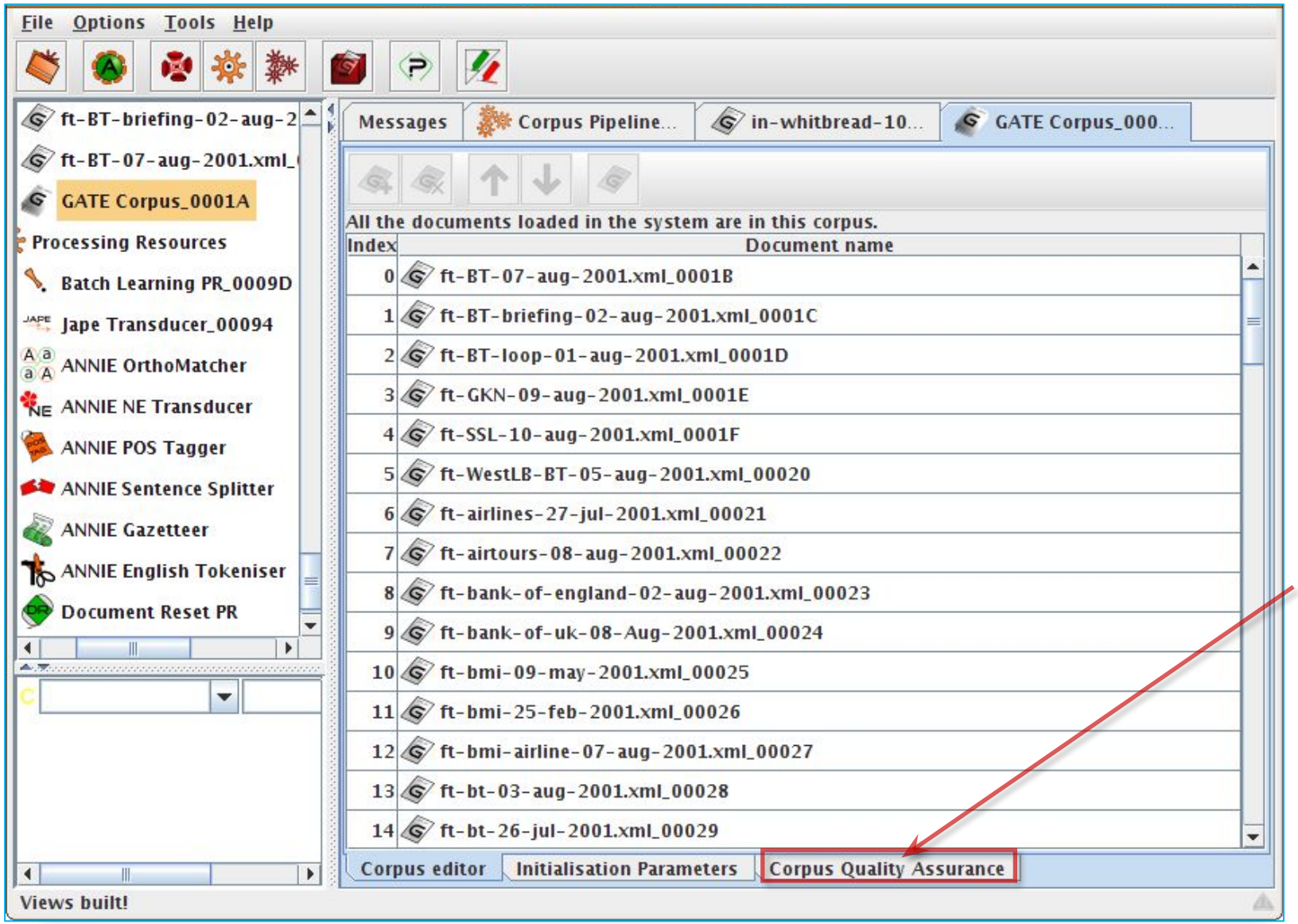
STRICT, LENIENT AND AVERAGE



CORPUS QUALITY ASSURANCE

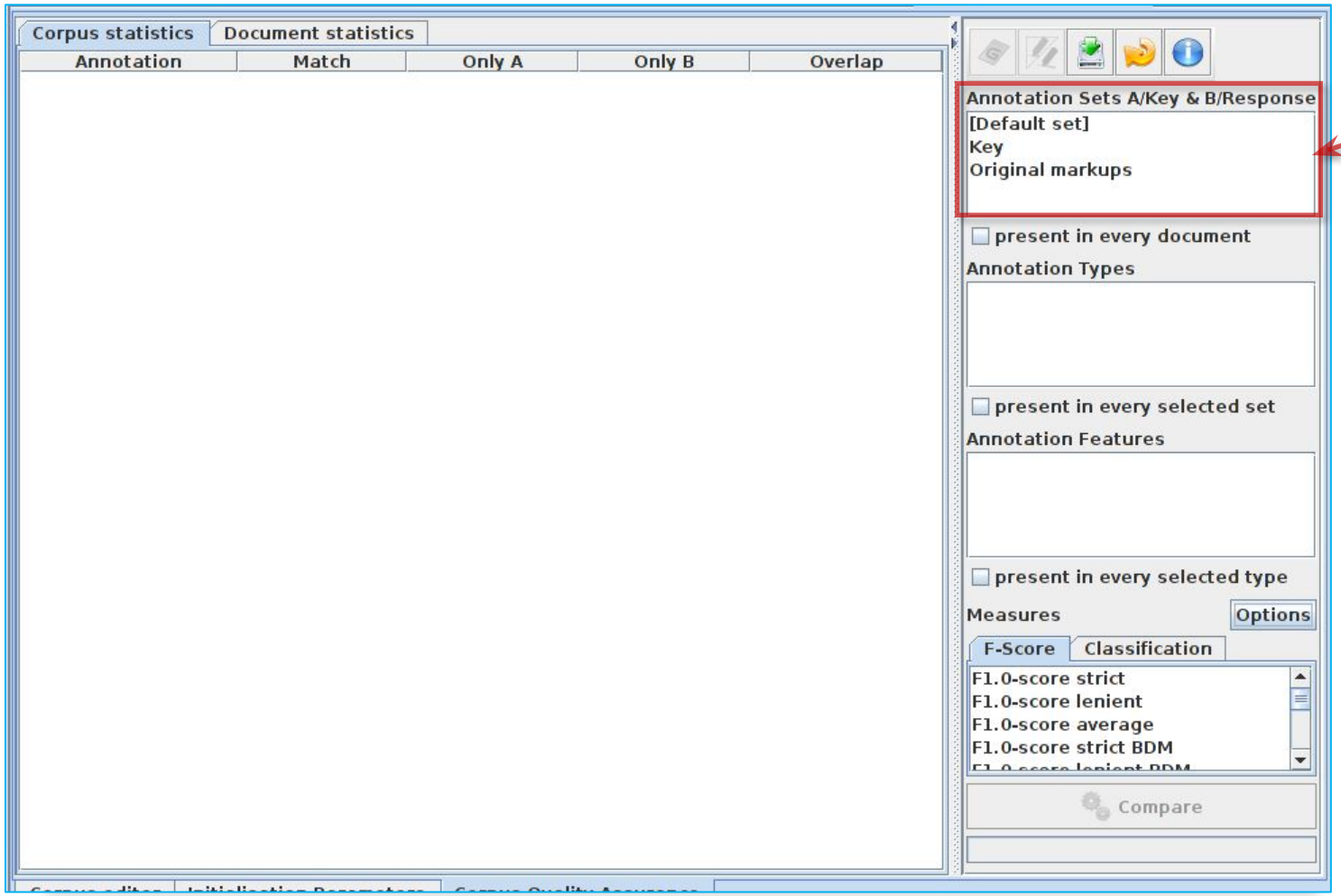
- **Corpus Quality Assurance tool extends the Annotation Diff** functionality to **the entire corpus,** rather than on a single document at a time.
- It **produces statistics both for the corpus as a whole** (Corpus statistics tab) **and for each document** separately (Document statistics tab).
- It **compares two annotation sets, but makes no assumptions about which (if either) set is the gold standard**. It just labels them A and B.
- This is because it can be used to measure **Inter Annotator Agreement (IAA)** where there is no concept of "correct" set.

TRY OUT CORPUS QUALITY ASSURANCE

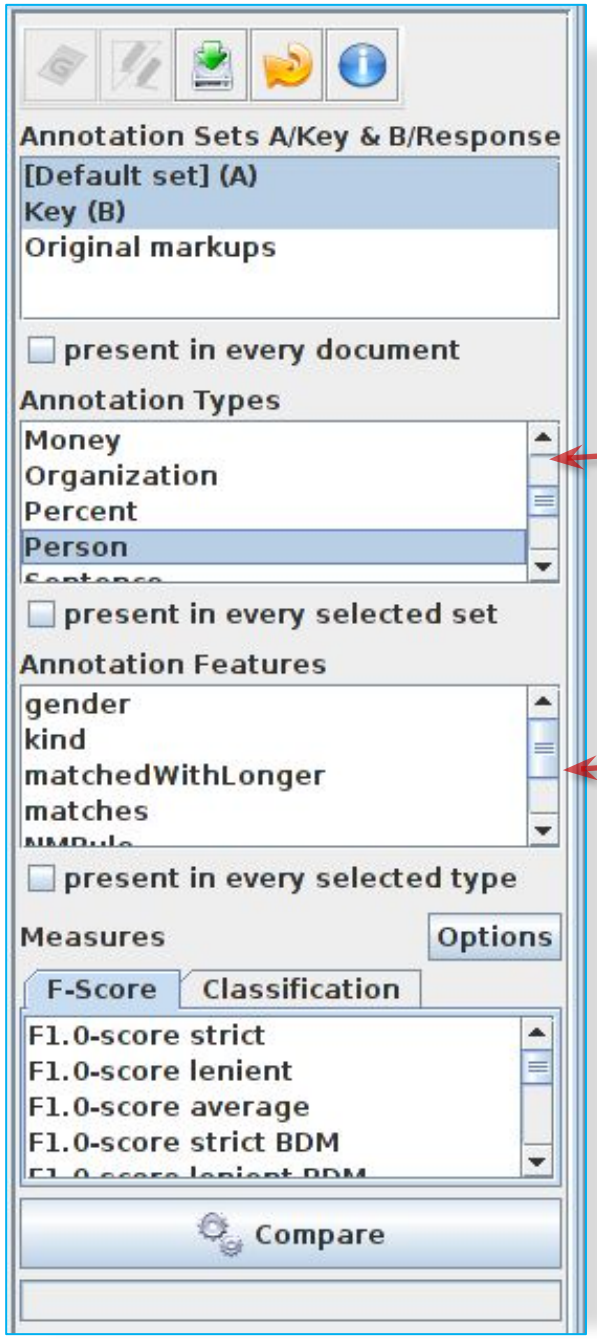


Open your hands-on corpus and click the **Corpus Quality Assurance** tab at the bottom of the Display pane.

SELECT ANNOTATION SETS



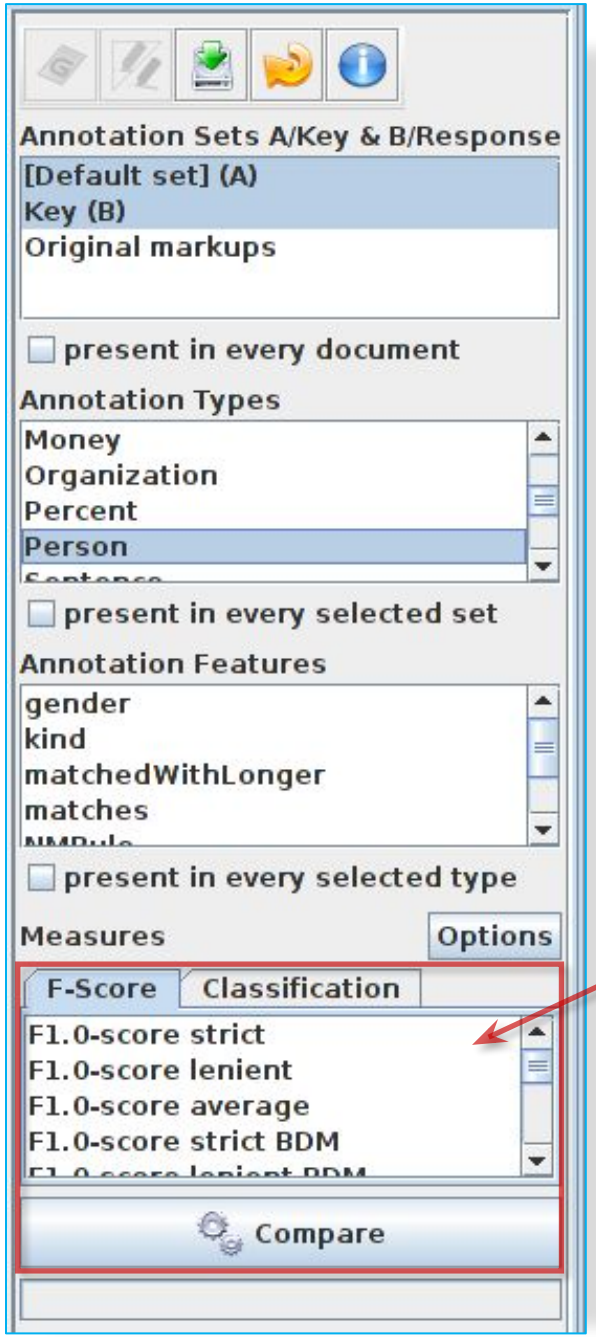
- **Select the annotation** sets you wish to compare.
- **Click on the Key annotation set** – this will label it set A.
- **Now click on the default annotation set** - this will label it set B.



Select Type

- **Select the annotation type to compare** (suggestion: select Organisation, Person and Location for now)
- **Select the features to include** (if any – leave unselected for now)

- **You can select as many types and features as you want.**



Select measure

- In the "**Measures**" box, **select the kind of F score** you want "Strict, Lenient, Average" or any combination of them.
- Suggestion: **try just "lenient" at first**.
- **Select Compare**

Corpus Statistics Tab

Corpus statistics | Document statistics

Annotation	Match	Only A	Only B	Overlap	Prec.B/A	Rec.B/A	F1.0-l.
Location	55	6	0	5	1.0000	0.9091	0.9524
Organization	76	5	15	11	0.8529	0.9457	0.8969
Person	28	2	1	0	0.9655	0.9333	0.9492
Macro summary					0.9395	0.9294	0.9328
Micro summary	159	13	16	16	0.9162	0.9309	0.9235

- Each annotation type is listed separately
- Precision, recall and F measure are given for each
- Two summary rows provide micro and macro averages

Micro and Macro Averaging

- Micro averaging treats the entire corpus as one big document, for the purposes of calculating precision, recall and F.

- Macro averaging takes the average of the rows.
  Here: the average **over different annotation types**

Document Statistics Tab

Corpus statistics | Document statistics

Document	Match	Only A	Only B	Overlap	Prec.B/A	Rec.B/A	F1.0-l.
ft-airlines-27-jul-2001.xml_00030	28	4	2	7	0.9459	0.8974	0.9211
ft-airtours-08-aug-2001.xml_00031	19	0	0	0	1.0000	1.0000	1.0000
ft-bank-of-england-02-aug-2001.xml_00032	22	2	2	1	0.9200	0.9200	0.9200
ft-bmi-09-may-2001.xml_00033	24	1	2	2	0.9286	0.9630	0.9455
ft-claims-direct-10-aug-2001.xml_00034	21	2	1	0	0.9545	0.9130	0.9333
ft-commerzbank-10-aug-2001.xml_00035	10	2	4	2	0.7500	0.8571	0.8000
ft-equitable-07-auf-2001.xml_00036	9	1	4	0	0.6923	0.9000	0.7826
ft-house-price-08-aug-2001.xml_00037	9	1	0	1	1.0000	0.9091	0.9524
ft-industrial-gloom-07-Aug-2001.xml_00038	17	0	1	3	0.9524	1.0000	0.9756
Macro summary					0.9049	0.9288	0.9145
Micro summary	159	13	16	16	0.9162	0.9309	0.9235

- Each document is listed separately.
- Precision, recall and F measure are given for each.
- Two summary rows provide micro and macro (here: **over documents**) averages.

SUMMARY

This session has been devoted to IE and ANNIE

You should now have a basic understanding of: what IE is and

how to load and run ANNIE,
what each of the ANNIE components do,
how to modify ANNIE components,

Evaluation using Annotation Diff and Corpus QA.

FUN EXTRA TASK

- If you have time, you can try annotating a document yourself with named entities and then comparing how you did with the existing Key annotation set
- Reminder: to annotate a document, make sure the right annotation set is selected with the mouse (we suggest adding a new one with your name) and then highlight the text you want to annotate. A popup window will appear, letting you select the annotation type.
- Use one of the evaluation tools to compare how you did!

THANK YOU!

Any Questions?

OPTIONAL MATERIAL

SAVING DOCUMENTS

Using datastores

Saving documents for use outside GATE

TYPES OF DATASTORES

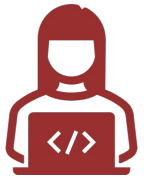
There are 2 types of datastore:

Serial datastores store data directly in a directory.

Lucene datastores provide a searchable repository with Lucene-based indexing.

For now, we'll look at serial datastores.

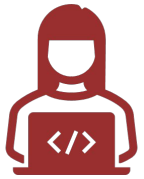
CREATE A NEW SERIAL DATASTORE



- **Right click** “**Datastores**” from the Resources pane and select “**Create Datastore**”
- **Select** “**Serial Datastore**”
- Create a new empty directory by clicking the “**Create New Folder**” icon and give your new directory a name
- Note: if this icon does not appear, try selecting the Metal Look & Feel (especially Mac users)
- **Select this directory** and **click** “**Open**”

Now your datastore is ready to store your documents

SAVE DOCUMENTS TO THE DATASTORE



- **Right click on your corpus and select "Save to Datastore"**
- Select the datastore that you just created
- Now **close the corpus and document**
- **Double click on the name of the datastore** in the Resources pane

  You should see the corpus and document
- **Double click on them to load them back** into GATE and view them

  They should contain the annotations you created previously

  You can remove things from the datastore **by right clicking** on their name in the datastore and **selecting "Delete"**

  You can add several corpora to the same datastore

  Note: in general, it's best to save the empty corpus to the datastore and **then** populate it, to avoid keeping a lot of documents in memory

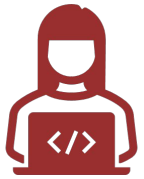
SAVING DOCUMENTS OUTSIDE GATE

Datastores can only be used inside GATE, because they use a GATE-specific format

If you want **to use your documents outside GATE,** you can save them in 2 ways:

- **Gate XML is a standoff markup,** a special GATE representation
- **Inline XML** has **inline annotations** (preserving the original format)

SAVING AS XML



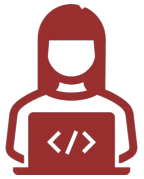
- Load any document from the hands-on material into GATE, then right click on it in the Resources pane
- Select "Save as **Gate XML**" and select a filename.

  In this format, all annotations are appended to the end of the document and the location for each annotation is marked by a tag in the body of the document

  Each annotation has a unique ID

  If you're curious, load the document into your favourite text editor and have a look at it!

IF YOU HAVE LOTS OF DOCUMENTS IN A CORPUS…



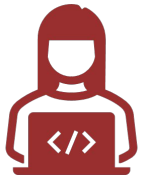
A datastore is the best way to store them, because it uses less memory in GATE when processing

- Delete all corpora and documents in your datastore
- Load a new corpus (**Language Resources → New → GATE Corpus**)
- Create a new datastore and **save the (empty) corpus** to the datastore
- Now populate your corpus (**right click on corpus → Populate**)

  You should see the documents appear in your datastore

  Your documents will be loaded into the datastore and saved automatically.
- Close and reopen your datastore to check they really were saved!

SAVE AS INLINE XML



This option will save the document with all the original annotations from HTML or XML documents, and any new annotations that you currently have selected in the document editor.

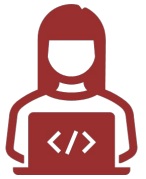
This can be useful for saving only a subset of the annotation types.

Annotations are saved using standard XML tags, with the annotation type as the tag name.

Partially overlapping annotations can not be saved.

- Right click on a document and select “**Inline XML**”
- Enter the annotationSetName
- Select annotationTypes
- Enter a name for the rootElement, e.g. doc
- Make sure the target path in Save To is correct (this can be an issue in windows machines)
- Click OK to save it.

FURTHER EXERCISES



- Load an HTML or XML document with the markupAware parameter set to false and see the difference
- Investigate the AnnotationStack
- Play with Advanced Options
- Run an application over documents in a datastore