Projects

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Computational Morphology and Electronic Dictionaries
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Outline

1. Course Requirements
2. How Projects Work
3. Project Topics
4. Forming Groups

Proposed Schedule Change

Exercise at 8:30

- Can we start the Exercise 15 minutes later, at 8:30 (rather than 8:15), so that it runs from 8:30 to 10:00?

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Course Requirements

- To pass this course ...
  - Exercises and assignments
  - Regular attendance
  - Course project: implementation of a small project including extensive documentation; presentation
    - Roughly last 4-5 weeks of semester
    - Programming and data analysis intensive
    - Short presentation

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Projects in Computational Morphology and Electronic Dictionaries

- Projects will be done in groups of about 3 people
- Procedure will be to send me a ranking of possible projects and teams (we will come back to this later)
- Please send the email at 19:00 this evening; emails sent earlier (even 1 minute earlier) will be looked at last

Evaluation

- Project code/analysis
- Write a project abstract, which includes what was done and who did what
- Project presentation
- Questions to individual group members

Schedule

- Today: presentation of topics (and later, your ranking)
- Wednesday: Project topics/groups announced, work starts (in class!)
- Several exercises over the next weeks: report on work in progress, interaction with Fraser and Berlanda

⇒ this is a chance to ask questions and indicate problems, but also to meet with your group (you'll need to meet outside as well)

⇒ will also allow us to adjust topics (particularly if too hard or too easy)

- More information on polishing abstract and on presentation in the exercise next week
- Abstract due Thursday July 20th at 8pm
- Presentations/questions in last two or three meetings (we'll use classrooms with a beamer for this, not Kalahari)

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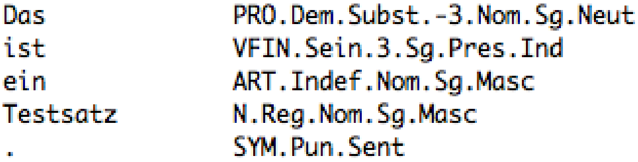
Introduction

Topics defined in terms of:

- Summary of what needs to be done
- Resources
- Programming Language (if applicable)
- Outcome
- Details of abstract (including whether German or English)
- What will be covered in the presentation

Problem: German Tagging and Lemmatization Difficult

- Summary: run German Marmot/Lemming (CIS Tagger/Lemmatizer) on two German corpora, provide a semi-automatic error analysis



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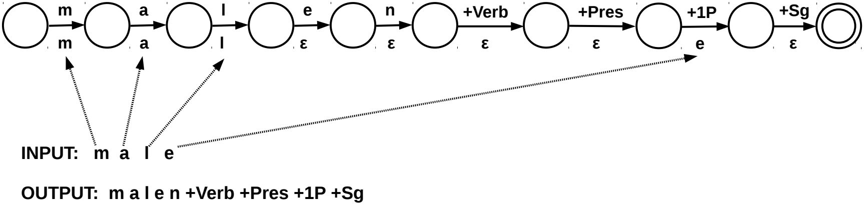
(example from RFTagger homepage, Schmid)

Project: Running German Tagger/Lemmatizer

- Summary: run German Marmot/Lemming (CIS Tagger/Lemmatizer) on two German corpora, provide a semi-automatic error analysis
- Resources: Two German corpora, SMOR (for manual disambiguation), Marmot/Lemming (see Thomas Mueller's web page)
- Programming Language: Python (for the semi-automatic analysis)
- Outcome: Error analysis pointing to strengths and weaknesses of Marmot/Lemming in two domains, python scripts for error analysis
- Abstract and Presentation: German or English, brief presentation on tagging/lemmatization, quantitative and qualitative discussion of results

Problem: German Verbs Have Complex Morphology

- Summary: Create SFST transducers which can be composed to analyze and generate German verbs (regular and irregular)



Project: German Verbs in SFST

- Summary: Create SFST transducers which can be composed to analyze and generate German verbs (regular and irregular)
- Resources: List of German verbs and their inflected forms, SFST
- Programming Language: SFST
- Outcome: Working transducers for analyzing and generating a large list of German verbs including both regulars and irregulars
- Abstract and Presentation: German or English, presentation of basic design of transducers including two examples (both regular and irregular verbs)

Project: English adjectives in SFST

- Summary: Create SFST transducers which can be composed to analyze and generate English adjectives
- Resources: List of English adjectives and their inflected forms, SFST
- Programming Language: SFST
- Outcome: Working transducers for analyzing and generating a large list of English adjectives
- Abstract and Presentation: German or English, presentation of basic design of transducers including examples

Problem: Rule-Based Machine Translation Highly Dependent on Morphology

- “Apertium is a shallow-transfer machine translation system, which uses finite state transducers for all of its lexical transformations, and hidden Markov models for part-of-speech tagging or word category disambiguation.” (source: Apertium Project)
- Summary: look at extending the system, probably the morphologies in the English/German pair

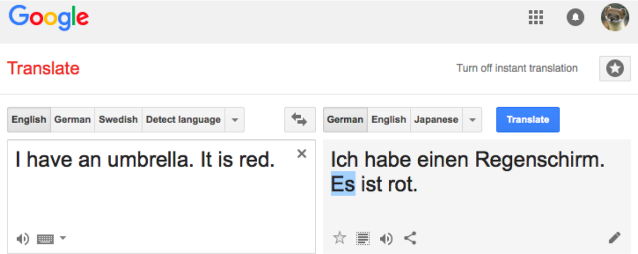
Project: Apertium Rule-Based Machine Translation

- Summary: look at extending the rule-based transfer Apertium system (open source), probably the morphologies in the English/German pair
- Resources: open-source Apertium software, Apertium manual, possibly German/English parallel data provided later
- Programming Language: Python (for checking coverage on corpus, possibly for error analysis, maybe for working with parallel data)
- Outcome: Extension of Apertium data in the English/German language pair
- Abstract and Presentation: English or German, basic presentation of how Apertium works, English and German morphologies, extensions carried out by the group

Analysing Machine Translation Output

The Problem

- Machine translation (e.g. Google Translate) is far from perfect
- For example in English → German translation
  - Incorrect verb inflections
  - Incorrect choice of pronoun
  - etc.



I have an umbrella. It is red.

Ich habe einen Regenschirm. Es ist rot.

Analysing Machine Translation Output

The Task: Find and categorise morphology errors in MT

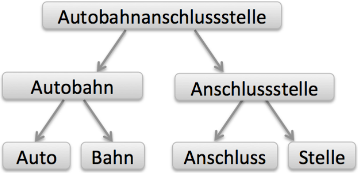
- **Preparation**: select a set of English texts
- **Translation**: translate the texts into German using a translation tool of your choice
- **Analysis**: identify errors in the German translations
- **Categorise**: construct a hierarchy / hierarchies of error categories
- **Write**: prepare guidelines for annotators to follow to label errors according to the categories
- **Assess**: follow the guidelines and annotate the translation of a test file
- **Assess**: assign a severity score to each error category
- **Code**: calculate document stats based on number of errors for each category: counts, average score over words in document, etc.

(also available: German to English translation)

Compound Splitting

The Problem

- German has many compound words, such as:
  - Bananenbrot (Banana bread)
  - Autobahnanschlussstelle (Motorway junction)
  - Donaudampfschiffahrtsgesellschaftskapitän (Danube steamship company captain)
- Long compound words may occur infrequently in text
- In NLP we often want to split them into shorter words to make them easier to handle (e.g. Machine Translation)



Compound Splitting

The Task: Design and build a compound splitter

- **Analysis**: examine a corpus of text and identify some compound words (test set)
- **Research**: read grammar books / look up existing compound splitters
- **Planning**: devise a set of compound splitting rules (or a method of your choice)
- **Development**: code up the method
- **Testing**: apply the method to a corpus of text and analyse the output

- Possible corpus resources:
  - TED Talk corpus: https://wit3.fbk.eu (XML format)
  - Europarl corpus: http://www.statmt.org/europarl/ (text format)

Text Generation

The Task: implement a text generation system

- Create a text generation system which is morphologically aware for German
- The idea is to create interactive narratives for use on touchscreen, and allow systematic changes to the narrative
- For instance, animals referred to by pronouns should be consistent; singular and plural groups should model subject-verb agreement
- Resources: SMOR
- Outcome: basic prototype of narrative generation system with clear morphological components
- Abstract and Presentation: English or German, basic presentation of challenges, how the system works and interaction with German morphological system

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Initial Group Discussions

- People discuss three times what to do in groups, grouped left-to-right and forwards-backwards and one move (front- row left, back-row right, forwards-backwards)
  - Please introduce yourselves, and then decide on a topic you could do together
- Email at 19:00 should contain TWO PARTS!:
  - PART ONE: Three teams (with team members!) and topics, in sorted order (preferred to least preferred)
  - PART TWO: Ranking of all 8 topics as an individual (preferred to least preferred)
- I reserve the right to completely ignore your preferences and just assign people however I want, sorry in advance

All Projects

- Tagging/Lemmatization
- SFST German verbs
- SFST English adjectives
- Apertium English-German
- MT Error Analysis English-German
- MT Error Analysis German-English
- Compound Splitting
- Text Generation

Thank you for your attention.