CzEng: Czech-English Parallel Corpus
Release version 0.5

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Abstract
We introduce CzEng 0.5, a new Czech-English sentence-aligned parallel corpus consisting of around 20 million tokens in either language. The corpus is available on the Internet and can be used under the terms of license agreement for non-commercial educational and research purposes. Besides the description of the corpus, also preliminary results concerning statistical machine translation experiments based on CzEng 0.5 are presented.

1 Introduction
CzEng 0.5\(^1\) is a Czech-English parallel corpus compiled at the Institute of Formal and Applied Linguistics, Charles University, Prague in 2005-2006. The corpus contains no manual annotation. It is limited only to texts which have been already available in an electronic form and which are not protected by authors’ rights in the Czech Republic. The main purpose of the corpus is to support Czech-English and English-Czech machine translation research with the necessary data. CzEng 0.5 is available free of charge for educational and research purposes, however, the users should become acquainted with the license agreement.\(^2\)

2 CzEng 0.5 Data
CzEng 0.5 consists of a large set of parallel textual documents mainly from the fields of European law, information technology, and fiction, all of them converted into a uniform XML-based file format and provided with automatic sentence alignment. The corpus contains altogether 7,743 document pairs. Full details on the corpus size are given in Table 1.

2.1 Data Sources
We have used texts from the following publicly available sources:
- Acquis Communautaire Parallel Corpus (Ralf et al., 2006),
- The European Constitution and KDE documentation from corpus OPUS (Tiedemann and Nygaard, 2004),
- Readers’ Digest texts were partially made available already in (Čmejrek et al., 2004),
- Kačenka was previously released as (Rambousek et al., 1997); because of the authors’ rights, CzEng 0.5 can include only its subset, namely the following books:
  - D. H. Lawrence: Sons and Lovers / Synové a milenci,
  - Ch. Dickens: The Pickwick Papers / Pickwickovci,
  - Ch. Dickens: Oliver Twist,
  - T. Hardy: Jude the Obscure / Neblahý Juda,

\(^1\)http://ufal.mff.cuni.cz/czeng/
\(^2\)http://ufal.mff.cuni.cz/czeng/license.html
- T. Hardy: Tess of the d’Urbervilles / Tess z d’Urbervillu,
- Other E-books were obtained from various Internet sources; the English side comes mainly from Project Gutenberg.³ CzEng 0.5 includes these books:
  - Jack London: The Star Rover / Tulák po hvězdách,
  - Franz Kafka: Trial / Proces,
  - E.A. Poe: The Narrative of Arthur Gordon Pym of Nantucket: Dobrodružství A.G.Pyma,
  - E.A. Poe: A Descent into the Maelstrom / Pád do Malstrømu,

<table>
<thead>
<tr>
<th>Document pairs</th>
<th>Sentences Czech</th>
<th>Sentences English</th>
<th>Words+Punctuation Czech</th>
<th>Words+Punctuation English</th>
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</thead>
<tbody>
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<td>Acquis Communautaire</td>
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<td>1,101,610</td>
<td>930,626</td>
<td>14,619,572</td>
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<td>81.0%</td>
<td>77.6%</td>
<td>71.8%</td>
<td>78.9%</td>
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<tr>
<td>European Constitution</td>
<td>47</td>
<td>11,506</td>
<td>10,380</td>
<td>138,853</td>
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<td>0.6%</td>
<td>0.8%</td>
<td>0.8%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Samples from European Journal</td>
<td>8</td>
<td>5,777</td>
<td>4,993</td>
<td>104,560</td>
</tr>
<tr>
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<td>0.4%</td>
<td>0.4%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Readers’ Digest</td>
<td>927</td>
<td>121,203</td>
<td>128,305</td>
<td>1,794,827</td>
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<tr>
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</tr>
<tr>
<td>Kačenka</td>
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<td>62,696</td>
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<td>5.6%</td>
</tr>
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<td>E-Books</td>
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<td>17,495</td>
<td>330,118</td>
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<td>1.4%</td>
<td>1.8%</td>
</tr>
<tr>
<td>KDE</td>
<td>479</td>
<td>98,789</td>
<td>133,897</td>
<td>495,052</td>
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<td>10.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Total</td>
<td>7,743</td>
<td>1,418,721</td>
<td>1,295,647</td>
<td>18,517,624</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 1: CzEng 0.5 sections and data sizes.

### 2.2 Preprocessing

Since the individual sources of parallel texts differ in many aspects, a lot of effort was required to integrate them into a common framework. Depending on the type of the input resource, (some of) the following steps have been applied on the Czech and English documents:

- conversion from PDF, Palm text (PDB DOC), SGML, HTML and other formats,
- encoding conversion (everything converted into UTF-8 character encoding), sometimes manual correction of mis-interpreted character codes,
- removing scanning errors, removing end-of-line hyphens,
- file renaming, directory restructuring,
- sentence segmentation,
- tokenization,
- removing long text segments having no counterpart in the corresponding document,
- adding sentence and token identifiers,
- conversion to a common XML format.

For the sake of simplicity, the tokenization and segmentation rules were reduced to a minimum. This decision leads to some unpleasant differences in tokenization and segmentation compared to the “common standard” of Penn-Treebank-like or Prague-Dependency-Treebank-like annotation.⁴

³http://www.gutenberg.org/  
⁴A different character class (digit, letter, punctuation) always starts a new token. Adjacent punctuation characters are encoded as separate tokens. Consecutive periods (...) thus lead to a sequence of one-token sentences. Moreover, no abbreviations were searched for. This hurts especially with titles (Dr.) or abbreviated names (O. Bojar), because a period followed by an upper-case letter is treated as the sentence boundary. All such expressions are thus split into several sentences.
### Table 2: Sentence alignment pairs according to number of sentences.

<table>
<thead>
<tr>
<th>English-Czech</th>
<th>1-1</th>
<th>0-1</th>
<th>1-2</th>
<th>2-1</th>
<th>1-0</th>
<th>1-3</th>
<th>0-2</th>
<th>3-1</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alignment pairs</td>
<td>924,543</td>
<td>97,929</td>
<td>70,879</td>
<td>69,558</td>
<td>64,490</td>
<td>23,538</td>
<td>8,526</td>
<td>6,768</td>
<td>24,943</td>
</tr>
<tr>
<td></td>
<td>71.6%</td>
<td>7.6%</td>
<td>5.5%</td>
<td>5.4%</td>
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<td>1.8%</td>
<td>0.7%</td>
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<td>1.9%</td>
</tr>
</tbody>
</table>

### 2.3 Sentence Alignment

All the documents were sentence-aligned using the *hunalign* tool\(^5\) (Varga et al., 2005). All the settings were kept default and we did not use any dictionary to bootstrap from. Hunalign collected its own temporary dictionary to improve sentence-level alignments.

The number of alignment pairs according to the number of sentences on the English and Czech side is given in Table 2.

### 3 First Machine-Translation Results Using CzEng 0.5

To provide a baseline for MT quality, we report BLEU (Papineni et al., 2002) scores of a state-of-the-art phrase-based MT system Moses.\(^6\)

For this experiment, we selected 1-1 aligned sentences up to 50 words from CzEng 0.5. From this subcorpus, a random selection of three independent test sets (3000 sentences each) was kept aside and the remaining 870k sentences were used for training. The training data contained 9.7M Czech and 11.4M English tokens (words and punctuation).

Table 3 reports baseline BLEU scores on 3000-sentence test set with 1 reference translation. The texts were only lowercased (including the reference translation) and no other special preprocessing was performed. No advanced features of Moses such as factored translation were utilized. We ran the experiment three times, always using one of the test sets to tune model parameters, another to evaluate the performance on unseen sentences and ignoring the third test set. For curiosity we also report BLEU scores when not translating at all, i.e. pretending that the source text is a translation in the target language. Only some punctuation, numbers or names thus score.

<table>
<thead>
<tr>
<th></th>
<th>1-1</th>
<th>0-1</th>
<th>1-2</th>
<th>2-1</th>
<th>1-0</th>
<th>1-3</th>
<th>0-2</th>
<th>3-1</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alignment pairs</td>
<td>924,543</td>
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<td>5.4%</td>
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<td>1.8%</td>
<td>0.7%</td>
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<td>1.9%</td>
</tr>
</tbody>
</table>

### 4 Summary And Further Plans

We have presented CzEng 0.5, a collection of Czech-English parallel texts. The corpus of about 20 million tokens is automatically sentence aligned. CzEng 0.5 is available free of charge for educational and research purposes, the licence allows collecting statistical data and making short citations. To our

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\(^5\)http://mokk.bme.hu/resources/hunalign

\(^6\)Moses has been developed during a summer workshop at Johns Hopkins University, as a drop-in replacement for Pharaoh (Koehn, 2004). See http://www.clap.jhu.edu/ws2006/groups/ossmt/ for more details.

\(^7\)English—Czech translation has also been attempted at the JHU workshop, report forthcoming.
<table>
<thead>
<tr>
<th>To English</th>
<th>To Czech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not translating at all</td>
<td>5.98±0.68</td>
</tr>
<tr>
<td>Baseline Moses translation</td>
<td>42.57±0.55</td>
</tr>
</tbody>
</table>

Table 3: BLEU scores of a baseline MT system trained and evaluated on CzEng 0.5 data. Test set of 3000 sentences, 1 reference translation.

knowledge, it is the biggest and the most diverse publicly available parallel corpus for the Czech-English pair.

In the future, we plan to further enlarge CzEng. Even now we are aware of various sources of parallel material available on the Internet and not included in CzEng; however, in most of these cases it seems impossible to make any use of such data without breaking the authors’ rights.

Future versions of CzEng will contain (machine) annotation of the data on various levels up to deep syntactic layer. We also plan to designate subsections of CzEng as standard development and evaluation data sets for machine translation, paying proper attention to cleaning up of these sets. Our future plans also include experimenting with several machine translation systems.

5 Acknowledgement

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References


