Neural Machine Translation reaches historic milestone: human parity for Chinese to English translations

Microsoft Translator   March 14, 2018

Machine Translation Course

Cristina España-Bonet & Raphael Rubino

UdS & DFKI

Summer Semester 2018

16th April 2017

Outline

Cristina España i Bonet (Part I)
Raphael Rubino (Part II)

UNIVERSITÄT DES SAARLANDES Translation-Oriented Language Technologies,
in Department of Language Science and Technology

DFKI *lt* Multilingual Technologies MLT Lab,
in Language Technology Lab

Cristina España i Bonet (Part I)

UNIVERSITÄT DES SAARLANDES   Translation-Oriented Language Technologies,
in Department of Language Science and Technology

Building A2.2, Office 1.24

Office hours: Wednesdays @12am
but check before!

Basic Questions

Prof. Dr. Josef van Genabith Chair

Lehrstuhl Translationsorientierte Sprachtechnologie

Work related to

- Machine Translation
- Information Retrieval
- and Multilingual Technologies in general

The team

**Josef van Genabith, Raphael Rubino,
Santanu Pal and Jingyi Zhang**

We usually have HiWi positions and/or thesis master topics
(examples later related to MT if we have time)

and you?

Basic Questions

- Introduction to machine translation going from statistical to neural machine translation systems and paying special attention to the current state of the art.

- A strong background on mathematics, statistics and machine learning is not required but a basic knowledge is expected to follow the course.

1 Introduction & Basics

2 Statistical Machine Translation

3 Neural Machine Translation

4 State of the Art

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Achieving Human Parity on Automatic Chinese to English News Translation

Hany Hassan, Anthony Aue, Chang Chen, Vishal Chowdhary, Jonathan Clark,
Christian Federmann, Xuedong Huang, Marcin Junczys-Dowmunt, William Lewis,
Mu Li, Shujie Liu, Tie-Yan Liu, Renqian Luo, Arul Menezes, Tao Qin,
Frank Seide, Xu Tan, Fei Tian, Lijun Wu, Shuangzhi Wu, Yingce Xia,
Dongdong Zhang, Zhirui Zhang, and Ming Zhou

Microsoft AI & Research

Abstract

Machine translation has made rapid advances in recent years. Millions of people are using
it today in online translation systems and mobile applications in order to communicate across
language barriers. The question naturally arises whether such systems can approach or achieve
parity with human translations. In this paper, we first address the problem of how to define
and accurately measure human parity in translation. We then describe Microsoft's machine
translation system and measure the quality of its translations on the widely used WMT 2017
news translation task from Chinese to English. We find that our latest neural machine trans-
lation system has reached a new state-of-the-art, and that the translation quality is at human
parity when compared to professional human translations. We also find that it significantly
exceeds the quality of crowd-sourced non-professional translations.

1   Introduction

Recent years have seen human performance levels reached or surpassed in tasks ranging from games
such as Go [32] to classification of images in ImageNet [20] to conversational speech recognition on
the Switchboard task [49].

In the area of machine translation, we have seen dramatic improvements in quality with the
advent of attentional encoder-decoder neural networks [34, 3, 38]. However, translation quality
continues to vary a great deal across language pairs, domains, and genres, more or less in direct

Basic Questions

- Classes with slides
  - Introduction to MT, SMT basics...

- Classes with laptop
  - Evaluation, Post-edition...

- 2 Labs (leading to an assignment)
  - SMT, NMT

Get your credits with...

3 assignments and a written exam

1 Report on SMT Lab

2 Report on NMT Lab

3 Short presentation and review of a paper

1. Report on SMT Lab
   $\sim$ week 4

2. Report on NMT Lab
   $\sim$ week 8

3. Short presentation and review of a paper
   $\sim$ week 12

Date for last assignment and
a written exam to be announced

(and negotiable)

There is no textbook for the course, but you can find general information in the following references. More especific texts or slides will be provided for each session.

- Statistical Machine Translation book by Philipp Koehn

- From SMT to NMT, three posts in a blog to understand the basics of NMT

- Chapter on Neural Machine Translation by Philipp Koehn

Resources

Classic Book Chapters

- Manning & Schütze, *Foundations of Statistical Natural Language Processing*, 1999, Chapter 13: Statistical Alignment and Machine Translation

- Jurafsky & Martin, *Speech and Language Processing*, Second Edition, 2009, Chapter 25: Machine Translation

- *Handbook of Natural Language Processing*, Second Edition, 2010, (eds.) Nitin Indurkhya and Fred J. Damerau, Chapter 17: Statistical Machine Translation (Abraham Ittycheria)

- *Handbook of Computational Linguistics an Natural Language Processing*, 2010, (eds.) Alexander Clarke, Chris Fox and Shalom Lappin. Chapter 19: Machine Translation (Any Way)

State of the art in **conferences** such as:

- ACL, EMNLP, COLING, CoNLL, ...
- WMT, MT-SUMMIT, AAMT, EAMT, ...

See last advances also in **journals**:

- Computational Linguistics, Machine Translation, ...

Not many journals in the field!

Resources

- MT **publications**: http://www.mt-archive.info/
  http://www.statmt.org/survey/

- **SMT website**: http://www.statmt.org/

- **Moses**: http://www.statmt.org/moses/

- MT Marathons

- **WMT**: http://www.statmt.org/wmt18

- **IWSLT**: http://workshop2017.iwslt.org

- **NIST**: https://www.nist.gov/itl/iad/mig/lorehlt-evaluations

You can find data, baseline systems, know what others do, what's best, differences among language pairs, etc.

EMNLP 2018
THIRD CONFERENCE ON
MACHINE TRANSLATION (WMT18)

October 31 — November 1, 2018
Brussels, Belgium

Home

[HOME]
TRANSLATION TASKS: [NEWS] [BIOMEDICAL] [MULTIMODAL]
EVALUATION TASKS: [METRICS] [QUALITY ESTIMATION]
OTHER TASKS: [AUTOMATIC POST-EDITING] [PARALLEL CORPUS FILTERING]

This conference builds on a series of annual workshops and conferences on statistical machine translation, going back to 2006:

- the NAACL-2006 Workshop on Statistical Machine Translation,
- the ACL-2007 Workshop on Statistical Machine Translation,
- the ACL-2008 Workshop on Statistical Machine Translation,
- the EACL-2009 Workshop on Statistical Machine Translation,
- the ACL-2010 Workshop on Statistical Machine Translation
- the EMNLP-2011 Workshop on Statistical Machine Translation
- the NAACL-2012 Workshop on Statistical Machine Translation,
- the ACL-2013 Workshop on Statistical Machine Translation,
- the ACL-2014 Workshop on Statistical Machine Translation,
- the EMNLP-2015 Workshop on Statistical Machine Translation,
- the First Conference on Machine Translation (at ACL-2016).
- the Second Conference on Machine Translation (at EMNLP-2017).

14th IWSLT, Tokyo, Japan, 14th - 15th December 2017

Navigation ↓

Evaluation Campaign

Google Sites Web Presence

The detailed information on the evaluation campaign can be found on this google sites document: https://sites.google.com/site/iwsltevaluation2017/ ↗

To participate in the evaluation, please fill out the registration form. ↗

In order to get up-to-date information, please join our e-mail list. ↗

Important Dates:

Multilingual text translation of TED talks, text translation of dialogues, and speech translation of lectures

- June 5, 2017: Release of train and dev data (*)
- Sep. 11 - 17, 2017: Multilingual task evaluation
- Sep. 11 - 17, 2017: Lectures ASR evaluation
- Sep. 18 - 24, 2017: Lectures SLT evaluation
- Sep. 18 - 24, 2017: Dialogue task evaluation

NIST

Information Technology Laboratory / Information Access Division

MULTIMODAL INFORMATION GROUP

Tools

Past HLT Evaluation
Projects

Staff

LoReHLT Evaluations

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Low Resource Languages for Emergent Incidents (LORELEI) is a DARPA-sponsored
program. The goal of the program is to dramatically advance the state of
computational linguistics and human language technology to enable rapid, low-cost
development of capabilities for low-resource languages.

This web page serves as a portal for all information pertaining to the Low Resource
(LoRe) HLT open evaluations of component technologies relevant to LORELEI. For
general questions and comments, please e-mail lorehlt_poc@nist.gov✉. For more
information about a specific evaluation cycle, including evaluation documentation,
see the year-specific sections below. For general announcements and discussing
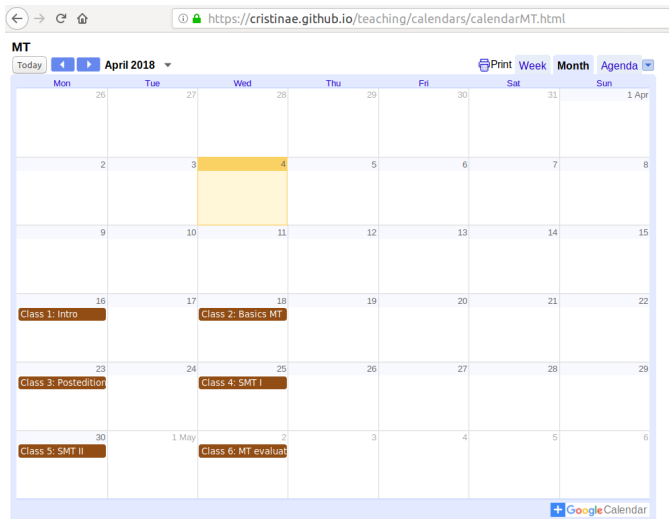regarding the LoReHLT evaluation series, you can subscribe to the LoReHLT mailing
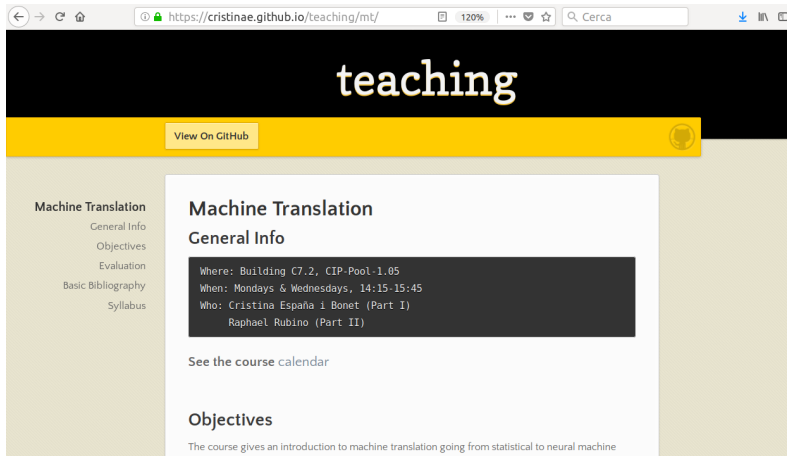
`https://cristinae.github.io/teaching/mt/`

Stay up-to-date

Calendar

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Back-up slides

Colloquium
"Introduction to Neural Networks and Language Technology"

Friday 25.05.2018, 10:00-17:00,
Konferenzsaal 1.20, Building A 2.2.

Programme:

10:00-13:00 Introduction to basic feed-forward neural neural networks
and how to train them using back-propagation (Josef van Genabith)
13:00-14:00 Lunch
14.00-15:30 Introduction to word embeddings (Cristina España i Bonet)
15:30-16:00 Coffee break
16.00-17:30 Introduction to neural machine translation (Raphael Rubino)