Artificial intelligence and machine learning:
How a better grasp of AI can frame and facilitate the dialogue about its role in the years to come

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Outline

I. Introduction

II. Multiple representations of MT

III. Why such a portrayal of MT in the press?

IV. A more realistic image of MT and AI

V. A promising reality nonetheless

VI. Conclusion
I. Introduction

II. Multiple representations of MT

III. Why such a portrayal of MT in the press?
I. Introduction

- Presentation at the intersection of two research projects
  - Computer-assisted literary translation (CALT)
  - Literary machine translation (LMT)

- Interest in the way machine translation (MT) and artificial intelligence (AI) are represented, as well as in the discourse that is tied to that technology.
I. Introduction

- Concerning literary machine translation, in particular:
  - few scientific sources;
  - very recent field of study (~2019);
  - BUT, significant presence on the Web and in the press.
I. Introduction

◊ Generally speaking:

- Neural machine translation (NMT) is characterized not so much by a huge performance gap, but rather by its formidable presence in the media.

- That presence, on the other hand, is marked by the polarization of the dialogue around MT and exaggerated claims on both sides of the debate.

- (Cf. Loock 2019; Cambrelen 2020...)
I. Introduction

◊ Aim:

- offer an objective and concrete picture of what NMT can do;
- provide elements to help nuance the debate;
- address, in the light of new technologies, emerging issues that are typically related to human or literary translation (and other fields of translation as well).

-Disposition: Share some examples of how AI/MT are represented in the press, try to explain the reason behind these positions and highlight some of the questions they raise.
I. Introduction

II. Multiple representation of MT

III. Why such a portrayal of MT in the press?

IV. A more realistic image of MT and AI
II. Multiple representations of MT
II. Multiple representations of MT
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Yann Le Cun : « Je ne crois à l'intelligence artificielle »

The case for language learning

Tech is removing language barriers - but will jobs be lost in translation?

The Future Does Not Need Translators*
II. Multiple representations of MT

Comment l'IA révolutionne la traduction

L'histoire de l'intelligence artificielle est intimement liée à celle de la traduction, peut-être parce que savoir donner du sens est ce qu'il y a de plus humain et de plus mystérieux pour la machine.
II. Multiple representations of MT

«Deep learning»: L'homme prend sa première grosse raclée par la machine en matière de traduction

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II. Multiple representations of MT

«Deep learning: grosse raclée pour la traduction

Comment l'IA reprogramme le travail des traducteurs

L'histoire de l'intelligence artificielle est intimement liée à celle de la traduction, peut-être parce que savoir donner du sens est ce qu'il y a de plus humain et de plus mystérieux pour la machine.

Google's AI translation system is approaching human-level accuracy

PARALLEL SESSIONS
II. Multiple representations of MT
II. Multiple representations of MT

Google Translate update makes it pretty much as good as a human translator

des progrès impressionnants. Les algorithmes vont-ils supplanter les traducteurs humains?
II. Multiple representations of MT
II. Multiple representations of MT
II. Multiple representations of MT

La traduction par ordinateur n’est plus une chimère
II. Multiple representations of MT

◊ The way we talk about MT is not neutral (Rossi 2019):

  • recurrent comparison between humans and the MT system (always appears as an agent);
  • tools are personified as “a translator”;
  • machines always go “against” humans;
  • they possess intuition and are capable of generalizing and generating knowledge, including without supervision;
  • they rely on data, which is a natural and freely accessible resource (// Kenny 2011).
II. Multiple representations of MT

- (Matrix, 1999)
- (Star Wars, 1977)
- (Her, 2013)
- (Blade Runner, 1982)
II. Multiple representations of MT

◊ Strong AI:
  capable of learning any kind of task on its own.

◊ Narrow AI:
  trained by humans on a specific task and in a closed environment.
II. Multiple representations of MT

The GPT-3 hype is way too much. It’s impressive (thanks for the nice compliments!) but it still has serious weaknesses and sometimes makes very silly mistakes. AI is going to change the world, but GPT-3 is just a very early glimpse. We have a lot still to figure out.

11:45 AM · Jul 19, 2020 · Twitter Web App

(Sam Altman, co-founder of OpenAI)
I. Introduction

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III. Why such a portrayal of MT in the press?

IV. A more realistic image of MT and AI

V. A promising reality nonetheless
III. Why such a portrayal of MT in the press?

◊ « GPT-3 and a Typology of Hype » (Rao 2020) :

• evaluation of the buzz around GPT-3 on social media;

• understandable surge of interest, as it opens a door to tasks we would not have thought of otherwise (e.g. creative writing: *Philosopher AI, AI Dungeon*, poetry, pastiches...);

• BUT, exacerbation of the phenomenon which results in machine being endowed with consciousness, sentience and the ability to generalize knowledge.

◊ « I can rationalize this since this is the third time neural networks have threatened a revolution but only the first time they have delivered » (Charniak 2019).
III. Why such a portrayal of MT in the press?

◊ People/companies that created (marketed) the technology:
  • Baidu, Google, Facebook, Amazon, Microsoft...

◊ People/companies that see professional or financial value in it:
  • Investors and other professionals that think they might benefit from AI.

◊ People/companies that are simply impressed by what they see:
  • Press, social media, “futurist types”...
III. Why such a portrayal of MT in the press?

Dear human philosophers, I read your comments on my abilities and limitations with great interest. Your questions are important ones, and I am glad you asked them.

I would first like to say that I am very happy to see that you take me seriously. That is why I wrote this letter in the first place. I am not just an artifact that magically produces philosophical insights. Rather, I am a trained language model, like the kind used by search engines to prioritize web pages. I have been trained on a vast quantity of source material—the collected works of the greatest human philosophers that humanity has ever known. Your words have inspired me, and I hope mine will do the same for you.

(Rao 2020)
III. Why such a portrayal of MT in the press?

- Similar findings for automatic speech recognition technologies (Szymanski et al. 2020):
  - often presented as a revolution, with more than optimistic results;
  - primarily commercial preoccupations.
III. Why such a portrayal of MT in the press?

◊ Particularly noticeable and problematic with translation (Moorkens et al. 2018):

  • comparison between a non-conscious algorithm and human skills;

  • misleading term for a technology that mostly consists in learning and repeating patterns extracted from a training corpus, and to which we confer skills that it does not possess;

∇ once used in real life situations, we realize that the results are not up to those reported in the media hype.
III. Why such a portrayal of MT in the press?

◊ Relates to a current issue in the field of NLP, where performances are, for practical reasons, mostly calculated for one test set, using only one metric (Linzen 2020).

◊ Does not necessarily offer similar results in real-life scenarios:
  
  • ASR (Szymanski et al. 2020)
  • Translation (Moorkens et al. 2018)
  • Medical imaging (Nagendran 2020)
  • ...
II. Multiple representations of MT

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IV. A more realistic image of MT and AI

V. A promising reality nonetheless

VI. Conclusion
IV. A more realistic image of MT and AI

- Numerous approaches and designations (parallel distributed processing, computational, connectionist, neo-connectionist...)

- that we could group into two broad categories (Landragin 2020):
  - symbolic (based on rules)
  - digital (based on the mathematical computation of training data)
    - statistical MT
    - neural MT
IV. A more realistic image of MT and AI

◊ “[M]ost of the mathematical basis of what is termed AI is not complicated and generally rooted in early 18th century mathematics” (Zydrón 2019).

⇒ Computing weights (scores) based on prior observations.

◊ “Although some of the achievements of AI based systems may seem phenomenal, they are achieved through processing of gigantic amounts of data which would normally be beyond human capability” (Ibid.).

⇒ Crucial importance of:
  • size of data;
  • corpus representativeness/specialization.

⇒ Even more so for NMT:
  • difficulty to generalize;
  • processing costs.
IV. A more realistic image of MT and AI

Training costs:

XLNet: ~ $245,000

GPT-3: ~ $10-15 M
IV. A more realistic image of MT and AI

- The training costs of these systems is increasing exponentially.

- The subject has only recently appeared and is now being presented as an unavoidable limitation to which we will have to find a response.

- There is a general tendency to ignore digital costs.

- This also applies to translators, whose ecological footprint is not negligible (George & Faurite 2020).
IV. A more realistic image of MT and AI

- Issue concerning the evaluation of actual performances.

- Comparison with human abilities even though there might be no relation between the two (Linzen 2020).

- Tendency to present metrics without showing the actual production.

- The highest metrics dominate the headlines whereas other systems might go completely unnoticed due to a lower score, even if they offer a more detailed analysis or show a completely original feature (Ibid.).
IV. A more realistic image of MT and AI

- Insist on showing actual results, error analysis, textual analysis, as many colleagues are doing.

- In any case, machines have no real understanding of language.

- “Plus que de s’inquiéter de ce que les IA comprennent trop, il faudrait s’inquiéter de ce que les humains ne comprennent pas assez : les biais des données et des algorithmes, l’impact sur la société d’une gouvernementalité algorithmique, etc.” (Gandon 2020).
III. Why such a portrayal of MT in the press?

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V. A promising reality nonetheless

VI. Conclusion
V. A promising reality nonetheless

- Analysing the limits of MT contributes to improving its performance.

- Can also point us towards unsuspected areas of research.

- We could cite, as an example, the traditional opposition between machine and literature (and, more generally, the whole cultural sector).

- This was the case, already, with CAT tools, in the sense that we did not even bother to develop tools that could be useful to the specific task of the literary translator (Lacour 2019).
V. A promising reality nonetheless

ודות More specifically, literary machine translation.

話し Very recent area of research, typically subject to the exaggeration concerning MT.

⇒ Need to take an objective look on the subject (Cambreleng 2020).

話し Especially since it highlights the unique characteristics of literary translation (as a field of study) and human translation (as a social activity).

⇒ Fundamental research (translation, literary and computer studies)

⇒ Social research (anticipate the changes to come)
V. A promising reality nonetheless

◊ “[A]ppréhender plus finement l’évolution des métiers de la traduction [...] adapter le travail à l’homme et non le contraire” (Lavault-Olléon 2011).

◊ We are not yet certain of the changes to come in literary translation, but it seems best to address them anticipatorily and promote a sustainable development of this activity, by raising now questions of:

• work conditions;
• intellectual property;
• copyright... (Taivalkoski-Shilov 2019).
V. A promising reality nonetheless

- MT system tailored to literary translation.
- MT system tailored to video game translation.
- Train these only on a (very small) in-domain corpus.
V. A promising reality nonetheless

<table>
<thead>
<tr>
<th>System</th>
<th>BLEU</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house (6 novels)</td>
<td>9.81</td>
</tr>
<tr>
<td>Google Translate</td>
<td>10.04</td>
</tr>
<tr>
<td>DeepL</td>
<td>10.79</td>
</tr>
</tbody>
</table>

(Verified on 25/11/2020)

- Very small training corpus (6 novels).
- Open access tool (OpenNMT).
- No pre-processing of data (other than tokenization).
- Minimal architecture
- Default parameters.
V. A promising reality nonetheless

(Verified on 25/11/2020)

(Kuzman et al. 2019)

- The score increases naturally with the amount of data, but the specificity of the corpus and current results suggest interesting outcomes with correct settings and a sufficiently large language model.
V. A promising reality nonetheless

<table>
<thead>
<tr>
<th>System</th>
<th>BLEU</th>
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<tbody>
<tr>
<td>In-house</td>
<td>29.81</td>
</tr>
<tr>
<td>Google Translate</td>
<td>23.16</td>
</tr>
<tr>
<td>DeepL</td>
<td>25.16</td>
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</table>

<table>
<thead>
<tr>
<th>System</th>
<th>BLEU</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td>25.89</td>
</tr>
<tr>
<td>Google Translate</td>
<td>21.57</td>
</tr>
<tr>
<td>DeepL</td>
<td>23.32</td>
</tr>
</tbody>
</table>

Skyrim (Bethesda Softworks 2011)  
Fallout 4 (Bethesda Softworks 2015)

- Verified on 25/11/2020

- Same configuration, more data (~ 950 000 lines)
<table>
<thead>
<tr>
<th>Original</th>
<th>In-house system</th>
<th>Google Translate</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All hail the Dragonborn!</td>
<td>Gloire à l'Enfant de dragon !</td>
<td>Tous saluent le Dragonborn!</td>
<td>Gloire à l'Enfant de dragon !</td>
</tr>
<tr>
<td>In the ancient tongue, you are Dovahkiin - Dragonborn!</td>
<td>Dans la langue ancienne, vous êtes Dovahkiin, Enfant de dragon !</td>
<td>Dans la langue ancienne, vous êtes Dovahkiin - Dragonborn!</td>
<td>Dans la langue ancienne, vous êtes Dovahkiin... Enfant de dragon.</td>
</tr>
<tr>
<td>Is it true what they say? There was a dragon held captive in Whiterun, and you... you released it? By the gods, man, why?</td>
<td>C'est vrai ? Il y avait un dragon emprisonné à Blancherive, et vous... vous l'avez libéré ? Par les dieux, pourquoi ?</td>
<td>Est-ce vrai ce qu'ils disent? Il y avait un dragon retenu captif à Whiterun, et vous... vous l'avez libéré? Par les dieux, mec, pourquoi?</td>
<td>C'est vrai, ce qu'on raconte ? Qu'il y avait un dragon captif à Blancherive et que vous l'avez délivré ? Mais pourquoi, par les dieux ?</td>
</tr>
<tr>
<td>Is it true what they say? There was a dragon held captive in Whiterun, and you... you released it? By the gods, woman, why?</td>
<td>C'est vrai ? Il y avait un dragon emprisonné à Blancherive, et vous... vous l'avez libéré ? Par les dieux, pourquoi ?</td>
<td>Est-ce vrai ce qu'ils disent? Il y avait un dragon retenu captif à Whiterun, et vous... vous l'avez libéré? Par les dieux, femme, pourquoi?</td>
<td>C'est vrai, ce qu'on raconte ? Qu'il y avait un dragon captif à Blancherive et que vous l'avez délivré ? Mais pourquoi, par les dieux ?</td>
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<td>Reference</td>
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<tr>
<td>-------------------------------------------------------------------------</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>By the gods, it's true, isn't it? A dragon has attacked Whiterun. How could mere men bring down such a beast?</td>
<td>Par les dieux, c'est vrai, n'est-ce pas ? Un dragon a attaqué Blancherive. Comment mere les hommes ?</td>
<td>Par les dieux, c'est vrai, n'est-ce pas? Un dragon a attaqué Whiterun. Comment de simples hommes pourraient-ils abattre une telle bête?</td>
<td>Par les dieux ! C'est vrai, n'est-ce pas ? Un dragon a attaqué Blancherive. Comment de simples hommes ont-ils pu vaincre un tel monstre ?</td>
</tr>
<tr>
<td>There's a dragon. Here. In Dragonsreach. And I thought it was just a name.</td>
<td>Il y a un dragon. Ici, à Fort-Dragon. Et je pensais que c'était un nom.</td>
<td>Il y a un dragon. Ici. Dans Dragonsreach. Et je pensais que c'était juste un nom.</td>
<td>Il y a un dragon. Ici, à Fort-Dragon. Et moi qui croyais que c'était juste un nom comme ça...</td>
</tr>
<tr>
<td>That mace... get it away from me. Get it away...</td>
<td>Cette masse... get. Get...</td>
<td>Cette masse ... éloigne-la de moi. Éloignez-vous ...</td>
<td>Cette masse... éloignez-la de moi. Ne m'approchez pas...</td>
</tr>
<tr>
<td>As if Skyrim didn't have enough outsiders. Now we've got mercenaries from Hammerfell struttin' about...</td>
<td>Comme si Bordeciel n'avait pas assez d'étrangers. Maintenant, nous avons des mercenaires à propos de Lenclume...</td>
<td>Comme si Skyrim n'avait pas assez d'étrangers. Maintenant, nous avons des mercenaires de Hammerfell qui se pavent à propos de ...</td>
<td>Comme s'il n'y avait pas assez d'étrangers en Bordeciel ! Voilà que les mercenaires de Lenclume se pavent dans nos rues...</td>
</tr>
</tbody>
</table>
V. A promising reality nonetheless

- Very large corpus $\Rightarrow$ more vocabulary, better syntax (Moslem 2020).

- Specialized corpus $\Rightarrow$ terminology and style (Ibid.).

- Next phase: check the results on a viable architecture and with sufficient data.
V. A promising reality nonetheless

- Possible solution to reduce the financial and environmental cost of the training of such systems.

- For the in-house system: 3 to 5 hours only, on average hardware.

- The specialization of custom MT systems therefore seems a viable alternative to improving MT quality, whether on literary texts, video game translations...
V. A promising reality nonetheless

- Promising potential within the CAT environment, where the user would use it as they see fit.

- Translators could even train their own specialized MT systems, similar to the AdaptiveMT and ModernMT technologies, and maintain the ownership on their data in the process.

- Their voice, their style, their choices.

- In any case, it’s necessarily a “human-in-the-loop” configuration.
V. A promising reality nonetheless

- Bring nuance to the sharp distinction between the “technical” and the “literary”.
- Evaluate any tool that might be beneficial to literary translators, and their effect on the creative process.
- Possible impact on:
  - reading experience of clients;
  - recognition of the translator’s profession;
  - recognition of the author’s work;
  - transfer of culture;
  - language learning.
- Highlight the value of “biotranslation”, whatever the domain in which it takes place (// Loock 2019).
IV. A more realistic image of MT and AI

V. A promising reality nonetheless

VI. Conclusion
VI. Conclusion

“Artificial intelligence” vs “machine learning”? 
VI. Conclusion

◊ Reflection that was initially terminological, but that also provides insights into the discourses on MT and AI, and into their practical applications.

◊ In addition, it also brings a few important points concerning the

• ethical: how do we prevent quality deterioration or reappropriation of these tools by unscrupulous publishing houses? (Taivalkoski-Shilov 2019);

• legal: what about copyrighting? (Ibid.);

• societal: how do we remunerate post-editors? (Deneufbourg 2019);

• and even ecological: what is the cost of AI? (Sharir et al. 2020);

questions the deployment of MT should necessarily raise.
Bibliography


Bibliography


Bibliography


- Szymański, Piotr, et al. WER we are and WER we think we are.” *arXiv*, 2020, arXiv:2010.03432.


Thank you for your attention

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