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AUTOMATIC TRANSLATION SYSTEM AGAINST DEEP NEURAL AUTOMATIC TRANSLATION SYSTEM

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ABSTRACT

In Our research, we offer a comparison of the statistical automatic translation system (SATS) and the deep neural automatic translation system (DNATS) whose translates from German text (GR) to Arabic text (AR) in the fixed field. The SATS uses the Noisy Channel procedure and the small datasets we developed it from the song of ice and fire saga to translate from GR text to AR text. The DNATS uses the deep neural networks the long short term memory method and the big datasets we developed it from the song of ice and fire saga to translate from GR text to AR text. The evaluation method used to evaluate the two system was the BELU method. We conclude that the tasks on behalf of SATS and DNATS of a low-resource linguistic for example Arabic and demonstrate that the DNATS cannot cost equally as well as the SATS, the future may still be hopeful for (GR-AR) text DNATS.

KEYWORDS: SATS, DNATS, ARS, Deep Learning, (GR-AR) text

مقارنة نظام الترجمة الآلية الإحصائي بنظام الترجمة الآلية المبني علي الشبكات العصبية العميقة

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الملخص

في بحثنا هذا نقدم مقارنة بين نظام الترجمة الآلية الإحصائي (SATS) ونظام الترجمة الآلية المبني علي الشبكات العصبية العميقة الذي يترجم من النص الألماني إلى النص العربي في مجال معين. نظام الترجمة الإحصائي تم بناؤه بطريقة القناة الصاخبة ومجموعات البيانات الصغيرة التي طورناها من قصة أغنية الثلج والنار للترجمة من نص ألماني إلى نص عربي. يستخدم نظام الترجمة الآلية المبني علي الشبكات العصبية العميقة الشبكات العصبية العميقة طريقة الذاكرة طويلة المدى ومجموعات البيانات الكبيرة التي قمنا بتطويرها من قصة أغنية الثلج والنار للترجمة من نص ألماني إلى نص عربي. كانت طريقة التقييم المستخدمة لتقييم النظامين هي طريقة تقييم النظم تحت الدراسة. نستنتج أن المهام التي يؤديها نظام الترجمة الآلي الإحصائي أقل من المهام التي يؤديها نظام الترجمة الآلي المبني علي الشبكات العصبية العميقة للغتين قليلة الموارد مثل اللغة العربية وثبت أن تكلفة بناء نظام الترجمة الآلية المبني علي الشبكات العصبية العميقة لا يمكن أن تتساوي مع نظام الترجمة الآلية الإحصائي ، ولا يزال المستقبل يبعث على الأمل بالنسبة لنظام الترجمة الآلية المبني علي الشبكات العصبية العميقة للنص الألماني و النص العربي.

الكلمات المفتاحية : نظام الترجمة الآلية ، نظام الترجمة الآلية العصبية العميقة ، النص الألماني ، النص العربي.

1. INTRODUCTION

This article shows the main differences between SATS and DNATS. In latest years, DNATS has been generally spoken as a major progress in the enhancement in the quality of SATS. But, for case a data starving, here is a fear that tongues by less resource does not use the similar point well-resources main tongues fix. Toward avoiding a low-resource language such as Arabic, we take the first steps towards applying (GR-AR) text DNATS.

Arabic is the language 1.7 billion Muslims everywhere the world performs their regular prayers. Arabic is a very organized and derivational language where morphology plays a very significant role. SATS is important in conference the language freedoms need of natural Arabic talkers. SATS has been established useful in the post-editing situation [1]. The achievement of this field specific SATS is due in amount to the availability of fine parallel data (Table 1). The excellence of SATS is now variable for authorized translation. But this is partially due to derogation necessary for the creation of official Arabic text. While all the worlds are moving towards using DNATS in the new stage, the Arabic text is not yet suitably supported.

Despite quite low accessibility of resources, we have before shown that an ATS can achieve positive translation quality [1]. The question remains whether DNATS can achieve a parallel level of usability for Arabic text [2]. We explosion on new marks after the training of an efficient Arabic text SATS, built on our data sets. We existing a DNATS reference line, created on the corresponding training and testing data.

This article is separated as follows: Segment II offers the related works, equally in relations of SATS and practice the SATS in skillful situations. Segment III summary the datasets training and testing. Segment IV facts the SATS and DNATS implementation. Section V offers the efficient results for the (GR-AR) text SATS in this field and founds pilot results for (GR-AR) DNATS. Lastly, Segment VI offers specific conclusions and future work.

2. ASSOCIATED EFFORT

Presently the main attention on the application of Arabic ATS is classified, then in place of such, development in this range in terms of improvements in approaches is of interest to us. Many studies show the mixture of SATS, and workflow improves productivity [3]. Finished the overview of DNATS, the training investigates the changes among the SATS and DNATS carried out a small-scale study on post-editing [4] and decided the DNATS had complete important confident changes in the field. An important stage explains proceeding using DNATS in its place of SATS in the automatic post-editing (APE) responsibilities at the Talks on ATS [5]. The extensive quantifiable and qualitative valuation of SATS and DNATS carried out by automatic metrics and expert translators [6]. The outcomes remained varied generally. They varied from viewing confident outcomes for DNATS in relatives of enhanced fluency and errors, to attaining no specific improvements done SATS at the text level designed for APE. Although the training was accepted out on better-resourced language couples, they are silent, highly applicable in demonstrating the possible effect that the modification in SATS methods can have in real-life translation situations.
Left the analytical effect on translator productivity, there improved attention on the DNATS faults of, such as those sketched by Koehn [7]. As such, some progressive approaches have appeared. Many applications have been established by transfer learning approaches, sure with low-resourced linguistic create effective, for example the addition of linguistic features [8, 9]. Luong Show that, the procedure of attention DNATS can have progressive effects in many features of SATS, counting the treatment of extended sentences [10].

In the Arabic text, the absence of adequate data, beside with the absence of trained resources has resulted in limited progress in the capacity of (GR-AR) text SATS to date: As discussed in Section 1, the field exact SATS is currently in use by translators in the Division of Theories. This present study is the first effort to apply DNATS methods to (GR-AR) text.

3. THE DATASET

To deliver a precise evaluation in our SATS vs. DNATS experiments, we practice identical datasets for each method. This data has practically matched to the datasets that we have used in the SATS training [1]. The long forms of the dataset are found in Tables 1 and 2.

3.1 Multilingual Corpora (Translation Model)

Our datasets are built on the same way used in our previous SATS, through some extra corpora. German-to-Arabic observable translation dataset used the investigation technique contains unilingual and bilingual analyses of the book A Game of Thrones in German plus Arabic, parallel datasets shared the same training and development sets and used different test sets.
The Arabic sentences were tokenized and parsed by the Arabic syntactic parser model for Rhetorical book, and then lower-case. The German sentences were tokenized by the proposed clear-modified word segmented.

3.2 Monolingual Data (Language Model)

The SATS need to add monolingual data to training the linguistic model that aids to progress the SATS fluency. This data does not essentially require in-domain, and so our linguistic prototype was not trained for the GR text, however also with a mixture of two added datasets. Scope of translation model training data is shown in Table 1.

Table 1: Scope of translation model training data

Dataset	# of arguments (GR)	# of arguments (AR)	# of sentences
GR-AR	995,419	1,094,707	66,214

4. MODEL SETUP

4.1 SATS Baseline

Toward achieving the most updated results for this use situation, we train an SATS using Moses with the training data Koehn [7] labeled in Section III. Previous results presented that the 6-gram language model supports reporting different word order in (GR-AR) [1]. We use the Ken LM [11] to train the 6-gram language model sketched in Table 1. Also, we device the classified reordering tables to discourse subjects nearby word order. Our method will introduce the APES unit in the channel, which contains the grammar rules [1]. To make the most of consistency with our preceding work, we include the APES module in our SATS trials.

4.2 DNATS Baseline

To offer a pilot DNATS standard for (GR-AR) text, we device the DNATS, i.e., by prevention boundaries where potential improper in Figure 1. We use the attention encoder-decoder network to implement the DNATS methodology [12, 13]. The training uses the 2-layer LSTM with 500 hidden layers for 13 times. For judgment, we practice the same training data equally used in the ATS. The subsequent terminology scope is (50,002) German sentences and (50,004) Arabic sentences. We put the APES toward the DNATS output.

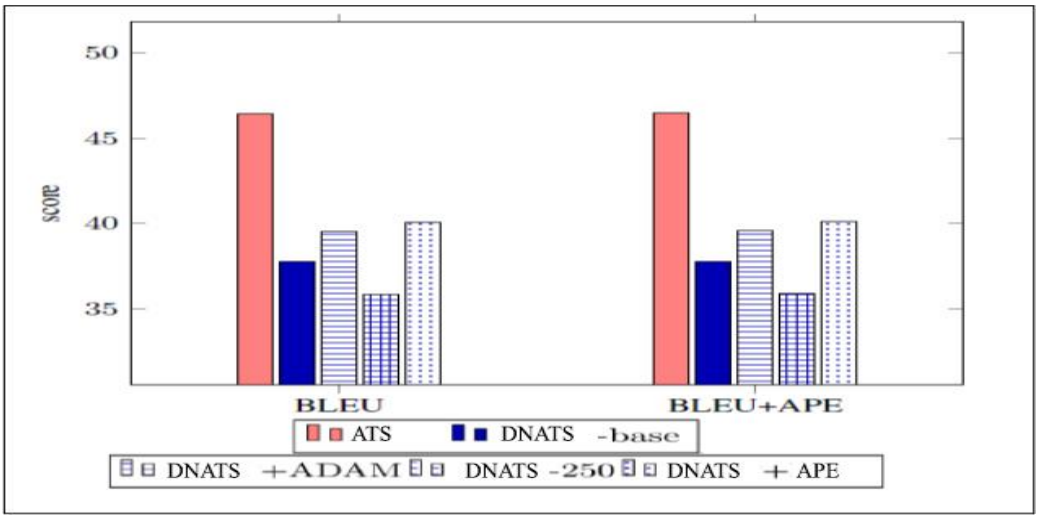

Fig. 1: The BLEU scores of the ATS and DNATS, with and without the APES

4.3 Additional DNATS Experiments

To enhance the standard system, we achieved limited trials to investigate the effect of parameters before using other approaches would have on the DNATS (GR-AR) text.

The DNATS-250 one such trial includes testing as hidden layers in our DNATS. The developed a minor prototype, i.e., 250 hidden layers. The structure consequences are obtainable in Table 2. We stated to as 'DNATS-250' and DNATS+ADAM, by applying the stochastic gradient descent with 'Adam', method for stochastic optimization [14]. This technique calculates separate learning degrees for altered factors after estimating the gradients. The optional learning rate for Adam (0.001) and represents the system in table 3 as DNATS+ADAM.

We are carrying out tests by using the byte-pair encoding (BPE) [15]. The DNATS+BPE reports the inflectional nature of the Arabic text, on the relations of ATS, it goes to growth vocabulary, attention by coding infrequent and unidentified sub word units. As data's meaning is a subject mainly related to a little resourced language, such as Irish, dropping the out of vocabulary (OOV) words is an able procedure. The system is stated as DNATS+BPE in Figure 1 and Table 3.

Table 2: monolingual text for training the language model

Dataset	# of arguments	# of sentences
GR-AR	1,596,569	76,569

Table 3: BLEU scores for the SATS and the DNATS for (GR-AR) text before and after applying the APES

	SATS	DNATS
BLEU	46.44	37.77
BLEU (+APE)	46.51	37.76
TER	43.31	47.94
TER (+APE)	43.32	47.79

5. PENALTIES AND PILOT STUDY

Both the SATS and DNATS were verified on the same test set that was used in previous experiments [1], involving 1,500 sentences arbitrarily designated from the fluent corpus.
The results illustrate for (GR-AR) text practice situation, the out-of-the-box DNATS can find a good standard of TER 47.94 and BLEU 38.04. But it does not completely the similar equal to the quality of our designer ATS. The modifications selected increase the DNATS BLEU score and use the BPE demonstrations a smooth extra noticeable enhancement. This progress does not achieve the quality of the SATS.

By admiration the DNATS-250 trial using the 250 hidden becomes a decrease in BLEU score. Additional testing will identify the best number of hidden for of the DNATS for (GR-AR) text. After the APES component is practical for the DNATS production, we get actual tiny BLEU the tendencies aimed at SATS. Still, the BLEU score growth does not always denote a well translation after a post-editing viewpoint [1]. This stimulus us to convey some study in this respect.

5.1 Sentence Level BLEU

In direction to improve an initial vision into exact alterations between (GR-AR) text ATS and DNATS, we selected to achieve the sentence-level BLEU on the SATS and the DNATS output. In Samples 1-4, we focus on some samples where SATS leaves behind DNATS, and vice-versa.

(1) Source German: die Inseln.
Arabic reference: الجزر.
SATS: الجزر.
DNATS: الجزيرة.
(DNATS decrease: -69.67 BLEU)

(2) Source: Wenn ein Antragsteller sich bereit erklärt, eine von ihm eingereichte Anfrage zu ändern, gilt das Datum des Eingangs der verfeinerten Anfrage als das Datum des Eingangs der FOI-Anfrage.
Arabic reference:
إذا وافق مقدم الطلب على تغيير الطلب المقدم من قبله ، يعتبر استلام الطلب المعدل معادلاً لاستلام طلب حرية المعلومات
SATS:
عندما يوافق المرشح على إجراء تعديل على طلب مقدم من قبله ، سيكون تاريخ استلام طلب حرية المعلومات هو تاريخ استلام الطلب المعدل.
DNATS:
عندما يوافق المرشح على تعديل طلب التقديم ، يعتبر المرشح قد تلقى الطلب.
(DNATS decrease: -41.56 BLEU)

(3) Source: Dies hilft auch bei möglichen Überprüfungen.
Arabic reference: هذا يساعد أيضا أي مراجعة محتملة.
SATS: أي الاستعراضات المحتملة تدعم أيضا هذا.
DNATS: هذا يساعد أيضا مع أي مراجعة محتملة.
(DNATS increase: +51.62)

(4) Source: mehr über Centenary Mayo.ie:
Arabic reference: مزيد من المعلومات حول الذكري السنوية لمايو
SATS: المزيد حول الذكري السنوية لمايو
DNATS: المزيد حول الذكري السنوية مايو
(DNATS growth: +35.0)

In Sample 1, the SATS BLEU score is meaningfully advanced than that of the DNATS production. Observing the translations, the DNATS acceptable the translated grammar, the source text (Inselbewohner ′ ‘German’). But SATS acceptably translates ‘German’ von den Inseln ′, which accurately translates as ‘الجزر’. In this field, inside the setting of community management, the

normal for ‘جزر’ is denote the correct noun sequence ‘الجزر’ (of German’)’. The sample places of interest the cost of a stable field, particularly slight supply SATS.

Sample 2 demonstrates the translation of an extended sentence, it is strong with Arabic text, why the ATS yield succeeds. The first expression is translated like a dream, after associated with the reference in the training data and the ATS is well translated it. Observing the DNATS output, the occurrence, not rare occurred: the translations ‘Anfrage' and ‘Kassenbon' remain frequent without cause (‘طلب “and ‘تلقى "). This is at times mentioned to as ‘over-translation’ [16] and can position difficulties for DNATS feature.

Samples 3 and 4 display DNATS products cases, translations have higher BLEU than the SATS. In Sample 3, DNATS yields an extra precise verb (يساعد ‘hilft ') as diverse to the SATS output (يدعم ‘unterstützt’) and accomplishes a nearly faultless translation (ايضا ‘also’ actuality a synonym for ايضا ‘auch’). It also selects the correct modulation for واحد ‘irgendein', which the ATS is unsuccessful to fix (outputting واحد). In Sample 4, the DNATS was achieving a practically good translation. The translation created by the SATS was not completely wrong. But it is dealing with that the DNATS production is extra fluent. Both samples best part the strong point of fluency from time to time observed with DNATS

CONCLUSIONS

Our research makes known that the DNATS, trained on the same (GR-AR) text data, attains a greatly minor translation excellence than a designer SATS, the smallest in idioms of metrics. The penalties not essentially, amazing assumed that (GR-AR) text offering several challenges the DNATS presently oppositions by data shortage. In detestation the pilots investigate not propose the DNATS remain shortened by the future of (GR-AR) text SATS. It must be celebrated the negligible modification and extra treatment has been carried out to date.

In future research, we will examine approaches for modifying DNATS to the language pair. The research discovers the occurrence of language features in DNATS. We demand to report translation subjects, perhaps by the practice of attention vectors. An additional method was allowing the different word order in the (GR-AR) linguistic pair using a pre-reordering method. Approaches which report data sparsity will contain the procedure of translation and data growth.
It will be significant to contain a human assessment in our training to confirm the SATS planned aimed at community management practice will be enhanced and will not just be tuned to automatic metrics.

Finally, there will be a huge growth in the (GR-AR) text translation stresses, and nationwide will need to look to technical progressions to delivery expert (GR-AR) text translation. SATS means are well-developed to encounter this request.

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