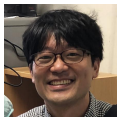


From Masked-Language Modeling to Translation: Non-English Auxiliary Tasks Improve Zero-shot Spoken Language Understanding

Rob van der Goot, Ibrahim Sharaf, Aizhan Imankulova, Ahmet
Üstün, Marija Stepanović, Alan Ramponi, Siti Oryza Khairunnisa,
Mamoru Komachi and Barbara Plank



Spoken Language Understanding

I'd like to see the showtimes for Silly Movie 2.0 at the movie house

Spoken Language Understanding

I'd like to see the showtimes for Silly Movie 2.0 at the movie house

Spoken Language Understanding

I'd like to see the showtimes for Silly Movie 2.0 at the movie house
Intent: SearchScreeningEvent

Spoken Language Understanding

Name	Source	Langs	Modern	Topics
Facebook	Schuster et al. (2019)	3	+	3
Snips	Coucke et al. (2018)	1	+	5
Atis	Hemphill et al. (1990)	1	-	1
MultiAtis	Xu et al. (2020)	9	-	1

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XSLU	van der Goot et al. (2021)	13	+	7

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- ▶ How about performance on Dutch? German? Italian? Serbian? Danish?
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- ▶ How about Kazakh? or Japanese? or Indonesian? or Arabic?
- ▶ Do we need a language model?
- ▶ How about Turkish?
- ▶ How about Chinese and South-Tyroleean?

- ▶ 250 test and 150 dev from Facebook data
- ▶ 250 test and 150 dev from Snips data
- ▶ Concatenate them and converge annotation style
- ▶ Colleague-sourced to get higher quality as crowd-sourced

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- ▶ Kappa agreement on Dutch slots (3 annotators): 92.4

ar	أود أن أرى مواعيد عرض فيلم Silly Movie 2.0 في دار السينما
da	Jeg vil gerne se spilletiderne for Silly Movie 2.0 i biografen
de	Ich würde gerne den Vorstellungsbeginn für Silly Movie 2.0 im Kino sehen
de-st	I mecht es Programm fir Silly Movie 2.0 in Film Haus sechn
en	I'd like to see the showtimes for Silly Movie 2.0 at the movie house
id	Saya ingin melihat jam tayang untuk Silly Movie 2.0 di gedung bioskop
it	Mi piacerebbe vedere gli orari degli spettacoli per Silly Movie 2.0 al cinema
ja	映画館 の Silly Movie 2.0 の上映時間を見せて。
kk	Мен Silly Movie 2.0 бағдарламасының кинотеатрда көрсетілім уақытын көргім келеді
nl	Ik wil graag de speeltijden van Silly Movie 2.0 in het filmhuis zien
sr	Želela bih da vidim raspored prikazivanja za Silly Movie 2.0 u bioskopu
tr	Silly Movie 2.0 'ın sinema salonundaki seanslarını görmek istiyorum
zh	我想看 Silly Movie 2.0 在 影院 的放映

Experiments

Baselines

- ▶ Baseline: contextualized embeddings with joint intent+slots
- ▶ Stronger baseline: translate training data to target language and map slot labels with attention (NMT-TRANSFER)

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- ▶ Baseline: contextualized embeddings with joint intent+slots
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New models:

- ▶ Train on auxiliary task in target language:
 - ▶ Masked language modeling (AUX-MLM)
 - ▶ Neural machine translation (AUX-NMT)
 - ▶ UD-parsing (AUX-UD)

Experiments

Evaluate 2 embeddings

- ▶ mBERT: trained on 104 languages (12/13)
- ▶ XLM15: trained on 15 languages (5/13)

Framework: MaChAmp

Massive Choice, Ample Tasks (MACHAMP):



A Toolkit for Multi-task Learning in NLP



Rob van der Goot 🇳🇱 **Ahmet Üstün** 🇳🇱 **Alan Ramponi** 🇮🇹🇸🇰 **Ibrahim Sharaf** 🇪🇬

Barbara Plank 🇳🇱

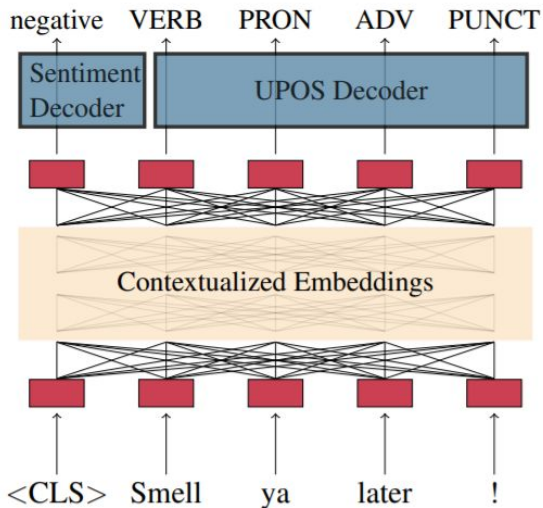
IT University of Copenhagen 🇩🇰 University of Groningen 🇳🇱 University of Trento 🇮🇹

Fondazione the Microsoft Research - University of Trento COSBI 🇮🇹 Factmata 🇪🇬

`robv@itu.dk, a.ustun@rug.nl, alan.ramponi@unitn.it`

`ibrahim.sharaf@factmata.com, bapl@itu.dk`

Framework: MaChAmp

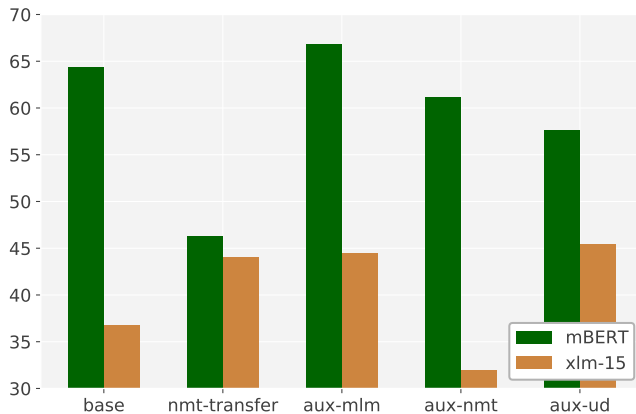


Results

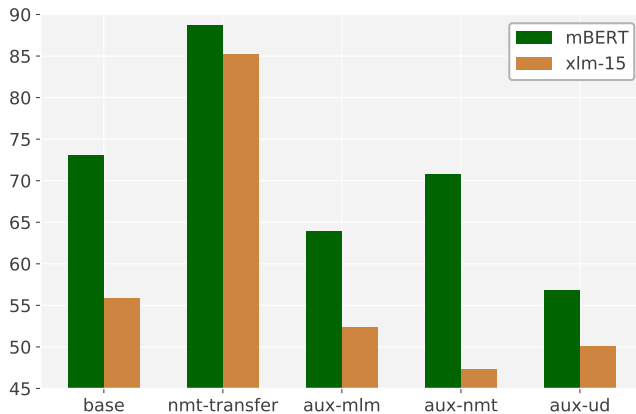
model	Time (minutes)
base	46
nmt-transfer	5,213
aux-mlm	193
aux-nmt	373
aux-ud	79

Table: Average minutes to train a model, averaged over all languages and both embeddings. For nmt-transfer we include the training of the NMT model.

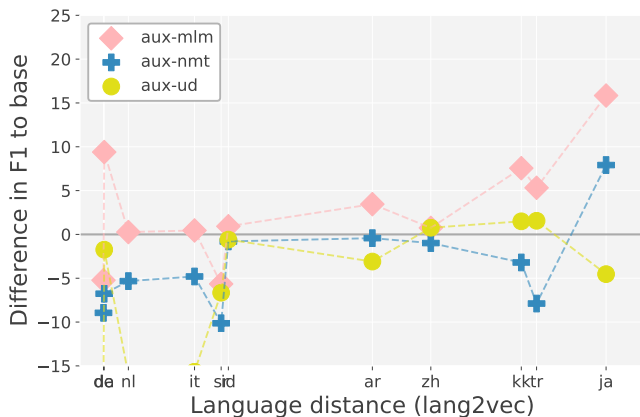
Results (slots)



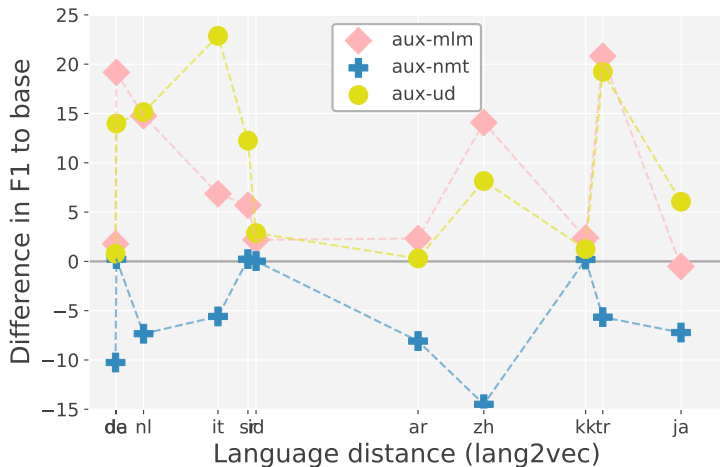
Results (intents)



Analysis (mBERT)



Analysis (XLM15)

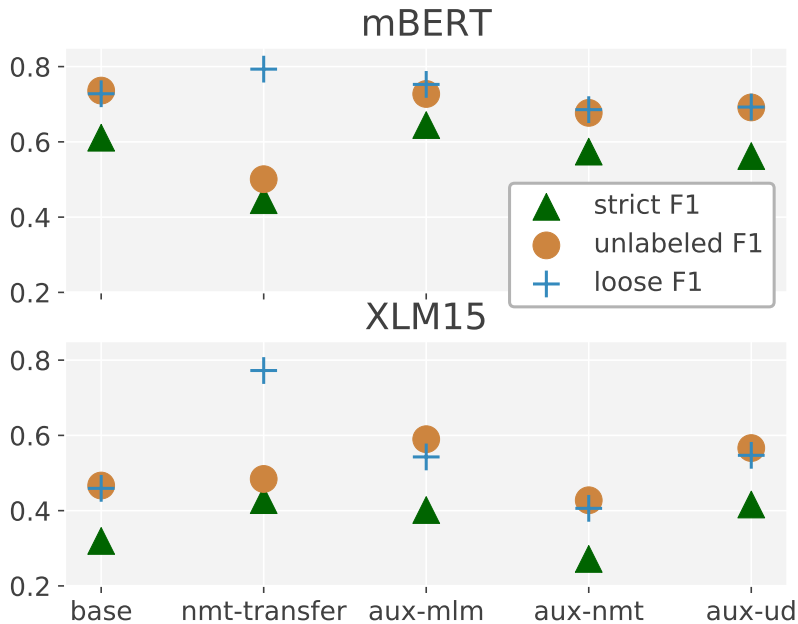


Analysis

Analysis metrics:

- ▶ Strict F1: normal span F1
- ▶ Unlabeled F1: throw away labels, only keep BIO
- ▶ Loose F1: consider partial matches (with same label) correct

Analysis

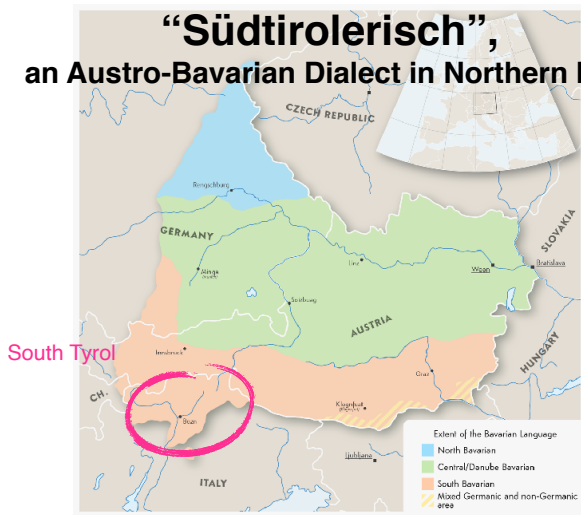


A closer look at South-Tyrolean

Slides from: Tackling the Long Tail in NLP: Transfer to Low-Resource Languages, Varieties and Dialects (Barbara Plank)

A closer look at South-Tyrolean

“Südtirolerisch”, an Austro-Bavarian Dialect in Northern Italy



https://upload.wikimedia.org/wikipedia/commons/thumb/a/ac/Austro_Bavarian_Languages-01.png/1024px-Austro_Bavarian_Languages-01.png 70

South Tyrolean: many local variants

- Annotated sample from the Wipptal area



A closer look at South-Tyrolean

South Tyrolean German dialect (“Südtirolerisch”):

- ▶ South Bavarian (Austro-Bavarian) German vernacular
- ▶ Spoken in the northernmost Italian province of South Tyrol
- ▶ No common orthographic standard
- ▶ Influence of Italian and Ladin in its lexicon:
“Hosch is Patent schun gemocht?”
patent=driver’s license (IT=Patente DE=Führerschein)

A closer look at South-Tyrolean

Almost no digital data available!

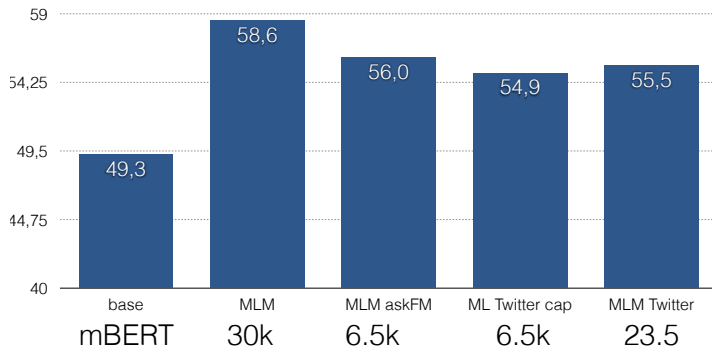
- ▶ Twitter: manually identified accounts, noisy.
- ▶ AskFM: little data available.

Samples from the two sources

- Twitter:
ich bin zwar total müde, aber ich muss noch lernen...wtf? :(
<USER> Stimmt überhaupt et..
<USER> <USER> Isch a imagine, schaugdo die aktion un ..
Und Milan het a uan wegn hond krign gimisst
<USER> Gia sveglio?
- AskFM:
wer isch dein bestr freind/in?:)
Laurii :P
Wer kennt dich am besten?
Niamend
Welche ist die schönste Sprache?
spanisch
Geasch geit stodt?:)♥
Bo keine ahnung..

A closer look at South-Tyrolean

De-ST: #sentences for MLM



Conclusions

- ▶ XSLU: More language(varieties), more label (domain/topic) variety and high quality annotation
- ▶ MLM performs robust as auxiliary task for slots
- ▶ For unseen languages, UD performs even better (XLM15)
- ▶ For intents, nmt-transfer is hard to beat, and auxiliary tasks are not beneficial