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Open Source Toolkit for Speech to Text Translation

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Abstract

In this paper we introduce an open source toolkit for speech translation. While there already exists a wide variety of open source tools for the essential tasks of a speech translation system, our goal is to provide an easy to use recipe for the complete pipeline of translating speech. We provide a Docker container with a ready to use pipeline of the following components: a neural speech recognition system, a sentence segmentation system and an attention-based translation system. We provide recipes for training and evaluating models for the task of translating English lectures and TED talks to German. Additionally, we provide pre-trained models for this task. With this toolkit we hope to facilitate the development of speech translation systems and to encourage researchers to improve the overall performance of speech translation systems.

1. Introduction

In recent years a great part of the research interest for automatic speech recognition (ASR) and machine translation (MT) systems focuses on neural approaches. ASR systems used to rely on separate components like a language model, a pronunciation dictionary and an acoustic model and machine translation systems on phrase based approaches. With the emergence of neural networks the implementation of ASR and MT systems became relatively easy, which lead to a number of open-source toolkits for both tasks. Examples for neural ASR toolkits include Eesen (Miao et al., 2015) and Espnet,¹ while XNMT (Neubig et al., 2018) and openNMT-py (Klein et al., 2017) mainly deal with MT systems.

¹<https://github.com/espnet/espnet>

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To prove that a Boolean expression is a contradiction, we can use a truth table and if we obtain that the Boolean expression is false in each row of the truth table, then the Boolean expression is a contradiction (since it is logically equivalent to FALSE).

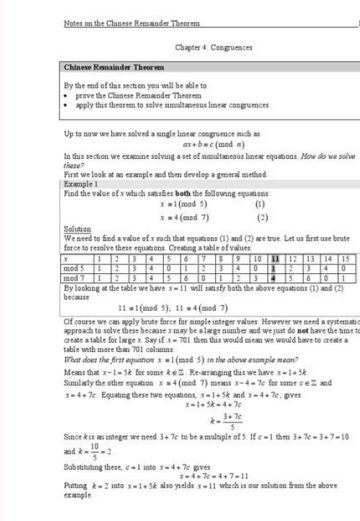
(a) To prove: $(x \vee y) \wedge (x \vee \neg y) \wedge \neg x$ is a contradiction .

PROOF

A disjunction $p \vee q$ is true, if either of the (sub)propositions (p or q) are true.
A negation $\neg p$ is true, if the (sub)proposition p is false.

x	y	$\neg x$	$\neg y$	$x \vee y$	$x \vee \neg y$	$(x \vee y) \wedge (x \vee \neg y)$	$(x \vee y) \wedge (x \vee \neg y) \wedge \neg x$
T	T	F	F	T	T	T	F
T	F	F	T	T	T	T	F
F	T	T	F	T	F	F	F
F	F	T	T	F	T	F	F

Since the last column contains only FALSE, $(x \vee y) \wedge (x \vee \neg y) \wedge \neg x$ is a contradiction .
□



Ryujin 3.5 door Satoshi Kamiya (神行 龍庭)

$(+3) + (+2) =$ $= 5$

$(-2) + (-4) =$ $= -6$

$(-5) + (+1) =$ $= -4$

$(+2) \times (+3) =$ $= 6$
Two rows of positive 3.

$(-8) \div (+4) =$ $= -2$
Divide into 4 rows.

$(+2) \times (-2) =$ $= -4$
Two rows of negative 2.

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