Project MAIA: Multilingual AI Agent Assistant

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Abstract

This paper presents the Multilingual Artificial Intelligence Agent Assistant (MAIA), a project led by Unbabel with the collaboration of CMU, INESC-ID and IT Lisbon. MAIA will employ cutting-edge machine learning and natural language processing technologies to build multilingual AI agent assistants, eliminating language barriers. MAIA's translation layer will empower human agents to provide customer support in real-time, in any language, with human quality.

1 Introduction

Online conversational support – chat – is the fastest growing customer service channel, being the preferred way for millennials to obtain customer service. Today, supporting international customers in this channel is mostly done by using human agents that speak different languages – a scarce and costly resource. The tremendous progress of language technologies (machine translation and dialogue systems) in the last years makes them an appealing tool for multilingual customer service. However, current systems are still too brittle and impractical: first, they require too much data and computing power, failing for domains or languages where labeled data is scarce; second, they do not capture contextual information (e.g. current MT systems work on a sentence-by-sentence basis, ignoring the conversation context); third, fully automatic systems lack human empathy and fail on unexpected scenarios, leading to low customer satisfaction. In MAIA, we will develop a multilingual conversational platform where human agents are assisted by AI agents. This approach will overcome the above limitations by targeting the following scientific and technological goals:

- New memory-efficient neural models for context-aware machine translation, suitable for online and real-time translation. These models will retain key aspects of a conversation (e.g., the gender of the customer), bringing them up whenever needed to translate a message.
- New answer generation techniques where the human agent (e.g., a tourism officer) will receive suggestions that reduce effort and increase the customer's (e.g. a tourist) satisfaction.
- New techniques for conversational quality estimation and sentiment analysis to assess how well the conversation is addressing the customer's needs, while simultaneously increasing "human empathy".
- Integration of the scientific advances above into a full end-to-end product. To this end, two demonstrators will be built to cover concrete use cases in the Travel and Tourism industries.

2 Overview of MAIA

Figure 1 displays a mock-up of the user interface to assist the human agent. Illustrated is the conversation history (on the agent's language), a list of answer suggestions, a message box supporting autocompletion where the agent can type the response, and an indicator of the sentiment of the customer throughout the conversation. The overarching goal of MAIA is to build context-aware, multilingual, empathetic agent assistants. These assistants will help human agents to provide real-time customer

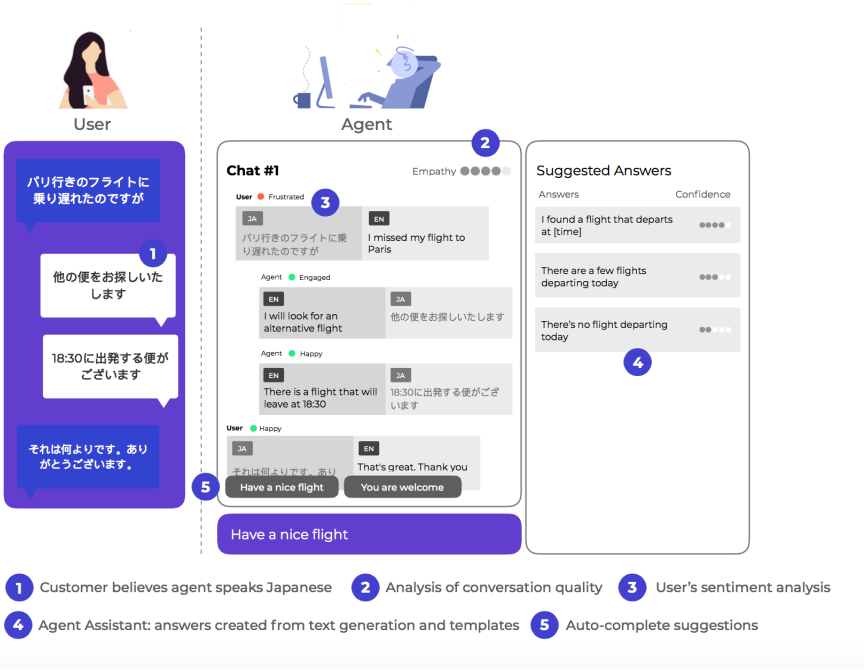

Figure 1: Mock-up of the user interface to assist the human agent.

service in multiple languages. This will be accomplished by pursuing the following objectives:

- **Translation layer for multilingual customer service.** Enabling multilingual customer service by using domain-adapted machine translation for translating messages sent from customers to agents and vice-versa. This will be ensured by developing new neural machine translation models that can be efficiently adapted to new domains and clients, the implementation of automatic retraining of machine translation engines, and an active learning strategy to use the Unbabel community of human post-editors to translate conversations offline, in a recurrent manner, to build an ever-increasing parallel datasets.
- **Conversational context-awareness.** Development of methods for neural machine translation and automatic response generation that take into account the context of the conversation. This requires the development of new machine learning methods that are able to compress the conversation history into a compact memory representation, and to pick the relevant elements whenever needed.
- **Modeling customer satisfaction via sentiment analysis and conversational quality estimation.** Development of a module for conversational quality estimation that is able to detect when the agent is effectively answering to the customer's needs, and react otherwise. This will trigger specific actions for either the machine translation or the answer generation modules. In addition, a sentiment analysis component will estimate the sentiment and emotions of the customer throughout the conversation, informing the agent.
- **Integration of the multilingual conversational platform and acquisition of reference customers.** Implementation of the MAIA platform and execution of Customer Discovery Programs for testing, validating, and improving product prototypes, testing for feasibility, usability, and viability. Execution of a plan for commercial exploitation and use of the plat- forms, systems, and technologies developed in MAIA.

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