Building Conversational Diagnosis Systems for Fine-grained Diseases using Few Annotated Data

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Abstract. The conversational diagnosis system aims to interview patients and make the diagnosis just like doctors do. Most existing methods rely on medical dialog corpora collected from various medical forums. Compared to experts' annotated data, the dialog corpora are easily accessible, but lack medical knowledge and diagnostic decision logic. Thus, those systems can only handle coarse-grained diseases but achieve poor performance on fine-grained diseases. In this paper, we present a Reinforcement Learning (RL) framework that leverages a few annotated (from experts) and unannotated (from online forums) dialogs to make the diagnosis for fine-grained diseases. We summarize the doctor's diagnosis logic from the unannotated dialogs, then build a user simulator by annotated dialogs for RL training. In this way, a few annotated data are sufficient to support fine-grained disease diagnosis with the assistance of unannotated data. The experiments on eight fine-grained diseases show that our approach outperforms other competitive baselines.

Keywords: Diagnosis Systems · Fine-grained Diseases · Few Data

1 Introduction

The conversational diagnosis system [23, 26, 16], which is a typical task-oriented dialog system [27, 22] in medical domain. It enables a smooth interaction between patients and computers via natural language and provides a reliable diagnosis for patients without too much time and expense. Existing conversational diagnosis systems usually employ reinforcement learning (RL) methods to build models for coarse-grained diseases using the dialog corpora from online forums. The training data from online forums are cheap and easy to access. Such dialogs contain medical common sense so the existing systems can do well on some easily diagnosed diseases, such as upper respiratory infection and infantile diarrhea. These diseases are from different clinical departments and can be easily diagnosed by some obvious symptoms, and we call them coarse-grained diseases. For example, DX dataset [23, 26], the only available conversational diagnosis dataset, consists of four types of diseases from different clinical departments.

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