

Advances in Intelligent Systems and Computing 881

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Proceedings of the Future Technologies Conference (FTC) 2018

Volume 2

 Springer

©2019

Proceedings of the Future Technologies Conference (FTC) 2018

Volume 2

Editors: Arai, Kohei, Bhatia, Rahul, Kapoor, Supriya (Eds.)

ISSN 2194-5357 ISSN 2194-5365 (electronic)
Advances in Intelligent Systems and Computing
ISBN 978-3-030-02682-0 ISBN 978-3-030-02683-7 (eBook)
<https://doi.org/10.1007/978-3-030-02683-7>

Library of Congress Control Number: 2018957983

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Modern Chatbot Systems: A Technical Review

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Abstract. Chatbot (Chatting Robot) is a computer system that allows human to interact with computers using Natural Human Language. This paper intends to present a technical review of five modern chatbot systems, namely, DeepProbe [27], AliMe [19], SuperAgent [4], MILABOT [21] and RubyStar [12]. Review elements will be covered in two general sections: (1) Architectural design; and (2) Implementation process. Architectural design section will review topics surrounding chatbot's knowledge domain, response generation, text processing and machine learning model, while implementation section will review dataset usage and evaluation strategy topics for each chatbot's case study. A summarized table of all reviewed elements is presented at the end of this paper together with discussion on our insight regarding the whole review. This paper will conclude with our view on the future roadmap for modern chatbot design.

Keywords: Chatbot system · Machine learning · Word embedding

1 Introduction

Recent years have shown the rise of chatbots that are in parallel with the advancement of Artificial Intelligence (AI). Although it was not new (first chatbot was proposed in 1966 [26]), chatbot has become more relevant today presumably due to a shift in communication landscape where the newer generation is prone to short messaging exchange (e.g. text/voice message) rather than long direct communication (e.g. phone call) [10]. On top of that, chatting with robot/computer nowadays has almost become a norm with such technology as Amazon Alexa, Google Assistant and Apple Siri, wrapped around beautiful consumer products that are smartphones and home smart speaker.

Modern chatbot design can generally be categorized into several base elements which are: (1) knowledge (open or close domain), (2) response generation (retrieval or generative), (3) text processing (vector embedding or latin alphabet), and (4) machine learning (ML) model (usually using neural network). In regards to these elements, the rest of this paper is organized as follows: Next section (Architectural Design) will review each elements in respect to the