

Shubham Agarwal

RESEARCH SOFTWARE ENGINEER · AI DIALOGUE SYSTEMS

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Work Experience

IBM Research, MIT-IBM Watson AI Lab

Cambridge, MA, U.S.A

RESEARCH SOFTWARE ENGINEER

Aug. 2017 - PRESENT

- Researched and built a Goal Oriented, AI Planning based Dialogue Agent
- Built a Model Acquisition Interface for dialogue designers enabling them to create AI Planning powered dialogue agents through declarative specification instead of legacy imperative
- Built and deployed overall service infrastructure utilizing Docker container
- Hosted the containerized dialogue agents on Kubernetes clusters enabling high-availability and auto-scaling along with continuous integration and deployment using Travis for development ease
- Delivered in-house technical tutorials on Kubernetes and Watson Assistant dialogue system
- Led a team of 6 and conducted technical interviews in a major recruiting event of MIT students
- Lead and coordinator of monthly social and team building activities

Arizona State University

Arizona, U.S.A

INSTRUCTOR

Fall 2016

- Taught CSE 205 - Object Oriented Programming and Data Structures to 114 students
- Responsibilities included teaching course material through lectures, setting assignments, tests and term examinations for the students

EMC Corporation

Bangalore, India

SOFTWARE ENGINEER INTERN

July 2014 - Dec. 2014

- Developed RESTful web service for data copy management and security testing in AppSync product of EMC
- Increased developer's efficiency and decreased cognitive load through in-house web service usage
- Developed backend in Java and frontend in Flex. Code successfully merged into production

Skills

Cloud Services	Cloud Functions, IBM Cloud, Watson Assistant, Dialog Flow, Watson NLU
Containers	Docker, Kubernetes
Back-end	REST API, Travis CI/CD, SQL and NoSQL Databases
Front-end	Hugo, HTML5, CSS, JavaScript(jQuery, Ajax)
Programming	Python, JAVA, JavaScript, LaTeX, PDDL, C, C++

Education

Arizona State University(ASU)

Arizona, USA

MASTER OF SCIENCE, COMPUTER SCIENCE

Aug. 2015 - Aug. 2017

- Thesis: "Aligning English Sentences with Abstract Meaning Representation Graphs using Inductive Logic Programming"
- Advisor: Dr. Chitta Baral, Professor at Computer Science Department, ASU
- CGPA: 3.72/4

Birla Institute of Technology and Science, Pilani

Rajasthan, India

BACHELORS, INFORMATION SYSTEMS

May 2011 - July 2015

- Semester long tech corporate internship experience at EMC Corp.
- CGPA: 7.24/10

Publications

MAI : AN INTELLIGENT MODEL ACQUISITION INTERFACE FOR INTERACTIVE SPECIFICATION OF DIALOG AGENTS TATHAGATA, C.; MUISE, C.; AGARWAL, S.; LASTRAS, L. In *AAAI Demonstrations Program*, 2019.

GENERATING DIALOGUE AGENTS VIA AUTOMATED PLANNING BOTEJA, A.; MUISE, C.; AGARWAL, S.; ALKAN, O.; BAJGAR, O.; DALY, E.; KISHIMOTO, A.; LASTRAS, L.; MARINESCU, R.; ONDREJ, J.; PEDEMONTE, P.; VODOLAN, M. In *The Second AAAI Workshop on Reasoning and Learning for Human-Machine Dialogues (DEEP-DIAL)*, 2019.

EXECUTING CONTINGENT PLANS: CHALLENGES IN DEPLOYING ARTIFICIAL AGENTS. MUISE, C.; VODOLAN, M.; AGARWAL, S.; BAJGAR, O.; AND LASTRAS, L. In *Fall Symposium on Integrating Planning, Diagnosis, and Causal Reasoning*, 2018.

ALIGNING ENGLISH SENTENCES WITH ABSTRACT MEANING REPRESENTATION GRAPHS USING INDUCTIVE LOGIC PROGRAMMING. AGARWAL, S. Diss. *Arizona State University*, 2017.

AUTOMATED SOFTWARE TEST DATA GENERATION USING IMPROVED SEARCH PROCEDURE AGARWAL, S.; BHATTER, A. IN *Lecture Notes on Software Engineering* 3, no. 2, 152, 2015.

Academic Projects

Aligning English Sentences With AMR graphs using ILP

Arizona, U.S.A

ASU, MASTERS THESIS

- AMR: Semantic formalism to English natural language encoding meaning of a sentence in a rooted graph
- Idea of approach was predicting concepts invoked by words in a sentence is same as aligning words to those concepts
- Extracted linguistic background knowledge from sentences like lemma, part of speech, modals, named entities, question tokens.
- Concepts in AMR split in nine categories. Learnt ILP rules for each category that invoke AMR concepts from sentence-AMR graph pairs in the training data
- Learnt ILP rules using open source system XHAIL deriving hypothesis in three steps : grounding, finding kernel, hypothesis generation
- Dataset consisted of 13050 AMR/English sentence pairs inclusive of 200 development and test pairs.
- Performance of the aligner was measured using precision, recall and f-score measures on test dataset [P=0.971 | R=0.858 | F=0.91]

Semantic Search on Movie Database

Arizona, U.S.A

ASU, NLP COURSE PROJECT

- Created a text based system that predicts movie names on input user query
- Dataset of movie summaries text crawled from IMDB
- Proposed and implemented a semantic approach to find similarity between query and movie summary texts. Created a movie graph of events with Characters(nodes) and Events(edges)
- Used a semantic K(knowledge)-parser to extract events from query and movie summaries
- Used multiple similarity scores to calculate similarity between input and movie graphs.
- Used NER similarity using Stanford CoreNLP, Term similarity using WS4J's PATH, LIN, LESK algorithms and Tf-IDF
- Used NLTK for NER detection and for name-co-reference unification of text
- Evaluated results using a hand prepared test dataset of 50 movies
- Led and coordinated team of 3

Honors & Awards

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| 2019 | Reviewer , AAAI Conference Demo Track | |
| 2018 | Certificate of Appreciation , First Patent Filed, IBM | <i>Cambridge, U.S.A</i> |
| 2016 | Winner , Annual Code Challenge, ASU | <i>Arizona, U.S.A</i> |
| 2016 | 8th Place , WCS Code Competition, ASU | <i>Arizona, U.S.A</i> |
| 2012 | Runner-Up , IBM Technical Contest | <i>Pilani, India</i> |