Sandeep Kumar

Education

University of North Carolina at Chapel Hill

MS in Computer Science

Indian Institute of Technology Kanpur

B.S. IN MATHEMATICS AND SCIENTIFIC COMPUTING (8.7/10)

Projects

Time-horizon based Hierarchical Robot Motion Planning

MASTERS PROJECT AT UNC CHAPEL HILL WITH PROF. RON ALTEROVITZ

- Incorporated real time guarantees in motion planning for safety-critical systems
- Developed a general hierarchical approach to outperform state-of-the-art methods in home-assistant scenarios
- Deployed the motion planner on multiple robots in a photorealistic robot simulator, iGibson, for navigation and manipulation tasks

Deep Bayesian Network for Visual Question Generation | WACV '20 PDF

- Developed a bayesian architecture to procure embeddings for various image related cues like place, caption and tags
- Employed a bayesian fusion and moderator module to obtain joint embeddings for different cues in PyTorch
- Obtained 5% improvement over previous state-of-the-art on the task of question generation on VQG-COCO dataset

Multimodal Differential Network for Visual Question Generation | EMNLP '18 PDF

- · Developed a method to incorporate exemplars to learn differential embeddings for generating natural questions for an image
- Obtained Multimodal embeddings by combining image and caption information which allows the model to capture relevant context
- Achieved state-of-the-art results on VQA-1.0 and VQG-COCO datasets

Learning Semantic Sentence Embeddings by Pairwise Discriminator | COLING '18 PDF

- · Proposed a novel deep learning method for obtaining sentence-level embeddings by solving the paraphrase generation task
- · Introduced a sequential pair-wise discriminator to obtain semantic and relevant sentence embeddings
- · Obtained state-of-the-art results on the task of paraphrase generation (Quora dataset) and sentiment analysis (SST dataset)

Related Experience

Introduction to Robotics, Models of Languages & Computation

TEACHING ASSISTANT AT UNC CHAPEL HILL

- Taught guest lectures on Robot Simulators and Automata theory, and created programming assignments for the courses
- · Helped create theoretical assignments and exam questions, and performed academic tutoring through multiple office hours

Interpretable Visual Dialog

RESEARCH INTERNSHIP WITH PROF. DEVI PARIKH

- · Built a Chatbot to generate interesting conversations about an image with a questioner and an answerer
- Analysed Visual Dialog models with the help of GradCAM visualisations
- Adopted a Multi-Task learning setting with Question reconstruction as the auxiliary task for dialog

Video Completion with Deep Learning

SOFTWARE DEVELOPER INTERNSHIP AT NVIDIA GRAPHICS BANGALORE

- Built a convolutional generative adversarial network for video generation
- Implemented multiple discriminators to ensure temporal and spatial consistency of videos
- Generated photorealistic and diverse videos by training on large datasets like YFCC100M and YouTube-8M

Relevant Courses

Robot Motion Planning, Machine Learning, Deep Learning and Graphics, Embedded Systems, Real-time Systems, Data Structures & Algorithms, Grounded Language & Narrative Understanding, Applied Stochastic Processes, Time Series Analysis, Files & Databases, Natural Language Processing

Technical Skills ____

Languages: Python, C++, C, SQL, MATLAB, R Tools: GIT, HTFX DL Frameworks : Tensorflow, Torch, PyTorch

Aug 2019 - Dec 2020

Mar 2018 - Jul 2019

Dec 2017 - Jan 2018

Jul 2015 - May 2019

Aug. 2019 - Dec 2021 (Expected)

Jan 2021 - Dec 2021

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