Mustafa Bedir Tapkan

Machine Learning Researcher/Engineer

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Highlights of Qualifications

- 5+ years of experience in reinforcement learning, artificial intelligence, machine learning and game theory
- Experience in 10+ open-source projects and development of large-scale software systems, such as many contributions to DeepMind's Open-Spiel
- 4+ years of experience pursuing research ideas, working in a self-paced environment.
- Expert in Python and C++ as well as low-level frameworks such as Pytorch and Tensorflow
- 5+ years of teaching experience presenting excellent communication skills, along with 10+ team projects
- 5+ years of leadership experience in ACM and organizing events such as hackathons

Education

MSc in Computer Science **September 2019 - August 2022**
University of Alberta Edmonton, AB, Canada
Area of Expertise: Machine Learning, Reinforcement Learning, Game Theory, Imperfect Information Games
Relevant Classes: RL I, Advanced RL, ML and Brain, Introduction to ML

BSc in Computer Science **September 2015 - December 2018**
North American University Houston, Texas, USA
Software Engineering / Minor in Math Education

Technical Skills

Programming/Scripting Languages Python, C++, SQL, Java, Swift, LaTeX, Bash
Frameworks/Libraries Numpy, Pytorch, Tensorflow, Open-Spiel, Pandas, Sklearn, Keras, Matplotlib, Airflow
Other Skills MySQL, Object-Oriented Programming, Linux, Git, UNIX, Docker, Kubernetes

Relevant Experience in Machine Learning & Reinforcement Learning

Graduate Research Assistant **April 2020 - August 2022**
University of Alberta Edmonton, AB, Canada

Challenge: Dark Hex is a board game that is a stepping stone to **large imperfect information games** after poker, yet there is very little work on it.
Solution:

- Examined and adopted regret-based methods alongside Reinforcement Learning to train strong players.
- Utilized **convolutional neural networks**, self-play methods (RL) and AlphaZero-like systems to generate **new state-of-the-art algorithms** that approximately solved the game.
- Achieved **strongest existing players** using the suggested new approach with above **0.75 win probability**.
- Built a **visual tool** to generate new complete policies that accelerated new strategy implementations and analysis by **more than 500%**.

Tools: C++, Python, Numpy, Tensorflow, PyTorch, Open Spiel, Tkinter, Git, Github
Repository: https://github.com/BedirT/darkhex

Key Projects

Anomaly Detection on CO_2 levels in ISS **December 2017 - April 2018**

Challenge: Astronauts in International Space Station (ISS) face health issues due to weak airflow. ISS is not equipped with a sensor system to detect location oriented CO_2 levels. In high-activity moments, CO_2 clusters form around the astronaut.

Solution:

- Detected anomalies in CO_2 levels in the ISS using deployed sensors on the bodies of the astronauts and building an **anomaly detection** system from the generated **time-series** data and machine learning.
- Presented a **poster** in Wearable Technologies Workshop at NASA.
- Used state of the art anomaly detection techniques such as **LSTM** and **RNN**.
- Set up a **dashboard** using data visualization techniques to receive annotation data and feedback further.

Tools: Python, PyTorch, Numpy, Pandas, JavaScript, Scikit-learn, Flask

Artificial Poet **March 2018**

Challenge: Poetry is an important part of any culture. The harmony between the words is discovered and examined by music and poetry. Recognizing and recreating these patterns is a nice way of capturing the underlying language properties.

Solution:

- Scraped 1000+ poetry and cleaned to get a usable dataset.
- Used state-of-the-art **NLP** methods, Recurrent Neural Networks (RNN) with word2vec to train models.
- **Deployed** the model on web servers and connected to Twitter using tweepy to make it publicly usable.

Tools: Python, Tflearn, Numpy, Pandas, BeautifulSoup, Tweepy

Repository: https://github.com/AhmetHamzaEmra/CakmaSair

Machine Learning Resume Processor (MLRPro) **April 2017**

Challenge: Prospective job candidates are missing tools to self-evaluate and determine the quality of their resumes.

Solution:

- Assembled a system to analyze resume strength based on past recruitment behaviour using state-of-the-art **NLP** methods which achieved the final accuracy of **96%**.
- Scraped and processed **data**, and created an easy to use **web application**.
- Led a team of three and got **first place** in the 2017 HackHouston Hackathon.

Tools: Python, Scikit-learn, Flask

Repository: https://github.com/MichaelMMeskhi/MLRP

Extracurricular Activities

Reinforcement Learning and Artificial Intelligence Lab (RLAI) ***Member*** **2019-Current**

- Attended 30+ talks and discussions and community events

Alberta Machine Intelligence Institute (AMII) ***Member*** **2019-Current**

- Participated in startup advisory program to evaluate and guide AI/ML in the startup ecosystem
- Joined early talent program and tested tools before release
- Attended 30+ social/networking events and seminars

ACM Chapter ***Chair, Vice Chair, Lab Leader, Senator*** **2015-2018**

- Hosted and organized two hackathons, 50+ talks, and 3+ team trips
- Attended daily voluntary meetings, restructured the club to increase the work efficiency by 70%
- Received best club award three years in a row

HackNAU - 2017 — 60+ Attendees hosted, ***Organizer & Director*** **2017**

- Worked with a team of 5 under the leading hackathon organization MLH
- Pitched the event to startups and companies for sponsorship

ACM-ICPC Regional Contest 4^{th} ***place*** **2017**

iHackathon — 30+ Attendees hosted, ***Organizer & Director*** **2016**