**Title:** Application of games using Augmented Reality

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**Introduction:**

We're embarking on an ambitious project to create an immersive Augmented Reality (AR) game using Unity Game Engine. Leveraging the powerful AR Foundation Kit, which integrates ARCore and ARKit tools, we're poised to deliver an unforgettable experience for both Android and iOS users.

Our vision is a wildlife simulator where players encounter virtual animals seamlessly integrated into their real-world surroundings. These creatures will exhibit realistic behaviors, creating a captivating experience for users. What sets our game apart is the integration of machine learning (ML) models, employing techniques like reinforcement and imitation learning via the ML Agents toolkit. This ensures that animal behaviors are dynamic and responsive, adding depth and realism to the gameplay.

In our development environment, we rely on Visual Studio and C#, taking advantage of Unity's seamless integration with these tools. This streamlines the development process, allowing us to focus on crafting engaging gameplay experiences.

The market for AR games on mobile platforms is ripe for innovation, with few successful examples like Pokémon Go. However, we believe there's enormous potential for growth and creativity in this space.

To ensure widespread accessibility, our game supports Android 7.0 (Nougat) and iOS 11.0 or later versions. Additionally, players must have smartphones equipped with gyroscopes and quality cameras to fully immerse themselves in the AR experience.

For our initial release, we're introducing two captivating creatures: Penguins and Pigs. These characters will serve as the foundation for our immersive wildlife ecosystem, with plans for expansion in the future.

With a focus on quality, innovation, and user experience, we're excited to bring our AR wildlife simulator to life, offering players an unparalleled blend of virtual and real-world adventure.

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| **Reference** | **Technique Used** | **Dataset Used** | **Performance Metrics** | **Key Points** |
| [1] | Deep Reinforcement Learning | N/A |  | The model is a convolutional neural network, trained with a variant of Q-learning |
| [2] | Deep Reinforcement Learning | N/A |  | Here the researchers have used double Q Learning. |
| [3] | Reinforcement Learning | N/A |  | An improved version of the DQN algorithm has been deployed |
| [4] | Reinforcement Learning | N/A |  | Used Proximal Policy Optimisation (a family of policy gradient methids) |
| [5] | Deep Reinforcement Learning | N/A |  | Uses a Dueling DQN algortihm |
| [6] | Deep Reinforcement Learning | N/A |  | demon-  strate that the deep Q-network agent, receiving only the pixels and  the game score as inputs, was able to surpass the performance of all  previous algorithms and achieve a level comparable to that of a pro-  fessional human games tester across a set of 49 games, using the same  algorithm, network architecture and hyperparameters. |
| [7] | General Reinforcement Learning | N/A |  | rive future research and provide baselines scores of  reward agents and unsupervised agents |
| [8] | General Reinforcement Learning | N/A |  | single AlphaZero algorithm that can achieve  superhuman performance in many challenging games |
| [9] | Deep Reinforcement Learning | N/A |  | Probabilistic Dynamics Models |
| [10] | Deep Reinforcement Learning | N/A |  | Used DQN algorithm |

***[1]*** *Volodymyr Mnih, December 2013, Playing Atari with Deep Reinforcement Learning, NIPS 2013 Deep Learning Workshop.*

***Link:*** [*https://www.cs.toronto.edu/~vmnih/docs/dqn.pdf*](https://www.cs.toronto.edu/~vmnih/docs/dqn.pdf)

***[2]*** *Hado Van Hasselt, 12 February 2016, Deep Reinforcement Learning with double Q-learning, AAAI'16: Proceedings of the Thirtieth AAAI Conference on Artificial Intelligence.  
Link:*[*https://www.researchgate.net/publication/282182152\_Deep\_Reinforcement\_Learning\_with\_Double\_Q-Learning*](https://www.researchgate.net/publication/282182152_Deep_Reinforcement_Learning_with_Double_Q-Learning)

***[3]*** *Matteo Hessel, 2018, Rainbow: Combining Improvements in Deep Reinforcement Learning,* AAAI Conference on Artificial Intelligence, 2018.

***Link:*** [*https://arxiv.org/pdf/1710.02298*](https://arxiv.org/pdf/1710.02298)

***[4]*** John Schulman,2017, Proximal Policy Optimization Algorithms, arXiv preprint arXiv:1707.06347.

***Link:*** [*https://arxiv.org/pdf/1707.06347*](https://arxiv.org/pdf/1707.06347)

***[5]*** *Ziyu Wang, 2016,* Dueling Network Architectures for Deep Reinforcement Learning, International Conference on Machine Learning.

***Link:*** [*https://arxiv.org/pdf/1511.06581*](https://arxiv.org/pdf/1511.06581)

***[6]*** *Volodymyr Mnih, 2015,* **Human-level control through deep reinforcement learning,** Nature.

***Link:***[*https://faculty.washington.edu/minster/bio\_inspired\_robotics/research\_articles/mnih\_atari\_deep\_reinforcement\_learning\_nature2015.pdf*](https://faculty.washington.edu/minster/bio_inspired_robotics/research_articles/mnih_atari_deep_reinforcement_learning_nature2015.pdf)

***[7]*** Danijar Hafner,2022, BENCHMARKING THE SPECTRUM OF AGENT CAPABILITIES

*Link:* [2109.06780 (arxiv.org)](https://arxiv.org/pdf/2109.06780)

***[8]*** *David Silver, 2018, Mastering Chess and Shogi by Self-Play with a General Reinforcement Learning Algorithm,* Science, DOI: 10.1126/science.aar6404.

*Link:*

[*https://www.semanticscholar.org/reader/38fb1902c6a2ab4f767d4532b28a92473ea737aa*](https://www.semanticscholar.org/reader/38fb1902c6a2ab4f767d4532b28a92473ea737aa)

***[9]*** *Kurtland Chua, 2018, Deep Reinforcement Learning in a Handful of Trials using Probabilistic Dynamics Models,* arXiv preprint arXiv:1805.12114, DOI: 10.1038/s41586-018-0024-8.

*Link:* [*https://proceedings.neurips.cc/paper\_files/paper/2018/file/3de568f8597b94bda53149c7d7f5958c-Paper.pdf*](https://proceedings.neurips.cc/paper_files/paper/2018/file/3de568f8597b94bda53149c7d7f5958c-Paper.pdf)

***[10]*** *Jacob Buckman,2016, Generalization and Regularization in DQN,* arXiv preprint arXiv:1611.01578, DOI: 10.1016/j.jal.2017.11.005.

*Link:*

<https://openreview.net/pdf?id=HkGmDsR9YQ>