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# A MOTION CAPTURE AND IMITATION LEARNING-BASED APPROACH TO ROBOT CONTROL

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A PREPRINT

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## ABSTRACT

Imitation Learning is a discipline of Machine Learning primarily concerned with replicating the behaviour of agents that are known to solve a particular task or family of tasks in a demonstration data set. In an industrial robotics context this presents the opportunity to replace explicit programming of behaviour with demonstrations of the task to be performed. Motion capture is one of the methods with which such demonstrations can be collected. It offers lesser model complexity compared to more indirect observation modalities such as visual data, yet requires additional data pre-processing if signals beyond effector position and orientation are relevant to the task at hand. In this paper, an approach for motion capture-based imitation learning and implicit control signal estimation is introduced and evaluated on an object throwing task.

**Keywords** Imitation Learning · Motion capture · Robotics · Artificial neural networks · RNN

## 1 Introduction

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### 1.1 Motivating use case

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### 1.2 Related Work

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## 2 Materials and Methods

See Section 2.

### 2.1 Data collection

bla bla bla

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## 2.2 Pre-processing, extraction of implicit control signals

bla bla bla

## 2.3 Models

bla bla bla

## 2.4 Visualization and execution

bla bla bla

## 2.5 Evaluation metrics

bla bla bla

## 3 Results

bla bla bla

## 4 Discussion

bla bla bla

## 5 Examples of citations, figures, tables, references

### 5.1 Citations

Citations use natbib. The documentation may be found at

<http://mirrors.ctan.org/macros/latex/contrib/natbib/natnotes.pdf>

Here is an example usage of the two main commands (`citet` and `citep`): Some people thought a thing [Kour and Saabne, 2014a, Hadash et al., 2018] but other people thought something else [Kour and Saabne, 2014b]. Many people have speculated that if we knew exactly why Kour and Saabne [2014b] thought this...

### References

- George Kour and Raid Saabne. Real-time segmentation of on-line handwritten arabic script. In *Frontiers in Handwriting Recognition (ICFHR), 2014 14th International Conference on*, pages 417–422. IEEE, 2014a.
- Guy Hadash, Einat Kermany, Boaz Carmeli, Ofer Lavi, George Kour, and Alon Jacovi. Estimate and replace: A novel approach to integrating deep neural networks with existing applications. *arXiv preprint arXiv:1804.09028*, 2018.
- George Kour and Raid Saabne. Fast classification of handwritten on-line arabic characters. In *Soft Computing and Pattern Recognition (SoCPaR), 2014 6th International Conference of*, pages 312–318. IEEE, 2014b. doi:10.1109/SOCPAR.2014.7008025.