

The Shot Predictor

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1. Problem Description

In basketball, the ability of a player to effectively shoot the basketball typically comes down to the player's shooting form. While the form of the best shooters tend to look different, they all typically use the same fundamentals. In our project, we will attempt to capture these fundamental aspects of a player's shooting form and attempt to predict the outcome of a shot using these features. Research has been done on extracting features from a player's movement to classify the action a player is performing (shooting, dribbling, etc.) [1], but we would like to focus our energy on feature extraction from the shooting motion using pose estimation [2], object detection [3], and possibly other methods to extract feature descriptors of a shot and attempt to identify it as a make or a miss.

This problem is a particularly nontrivial application of pose estimation for two main reasons. The first being that there are multiple stages to a basketball shot that need to be taken into account. From dipping the ball to waist level, to the motion of bringing the ball to eye level, to releasing the ball, each plays a significant role in the outcome of a shot, so each stage needs to be taken into account. The second reason is the variability of the average shot. It can be argued that no two shots are identical, when taking into account the speed of the shot and different shooting forms. This will require us to develop a method of capturing all the motions of a shot in a way that is invariant to the shot's speed and overall form.

2. Related Works

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The ABSTRACT and MAIN TEXT are to be in a two-column format.

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Figure and table captions should be 9-point Roman type as in `????`. Short captions should be centred.

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FIRST-ORDER HEADINGS. (For example, **1. Introduction**) should be Times 12-point boldface, initially capitalized, flush left, with one blank line before, and one blank line after.

SECOND-ORDER HEADINGS. (For example, **1.1. Database elements**) should be Times 11-point boldface, initially capitalized, flush left, with one blank line before, and one after. If you require a third-order heading (we discourage it), use 10-point Times, boldface, initially capitalized, flush left, preceded by one blank line, followed by a period and your text on the same line.

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Please use footnotes¹ sparingly. Indeed, try to avoid footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence). If you wish to use a footnote, place it at the bottom of the column on the page on which it is referenced. Use Times 8-point type, single-spaced.

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For the benefit of author(s) and readers, please use the

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\cref{...}
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To see how our method outperforms previous work, please see ?? and Tab. 1. It is also possible to refer to multiple targets as once, *e.g.* to `????`. You may also return to Sec. 2 or look at ??.

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```
\Cref{...}
```

command. Here is an example:

?? is also quite important.

¹This is what a footnote looks like. It often distracts the reader from the main flow of the argument.

Method	Frobnability
Theirs	Frumpy
Yours	Frobbly
Ours	Makes one's heart Frob

Table 1. Results. Ours is better.

2.5. References

List and number all bibliographical references in 9-point Times, single-spaced, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [4]. Where appropriate, include page numbers and the name(s) of editors of referenced books. When you cite multiple papers at once, please make sure that you cite them in numerical order like this [1–5]. If you use the template as advised, this will be taken care of automatically.

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```
\centering
```

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```
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References

- [1] FirstName Alpher. Frobnication. *IEEE TPAMI*, 12(1):234–778, 2002. 2
- [2] FirstName Alpher and FirstName Fotheringham-Smythe. Frobnication revisited. *Journal of Foo*, 13(1):234–778, 2003. 2
- [3] FirstName Alpher and FirstName Gamow. Can a computer frobnicate? In *CVPR*, pages 234–778, 2005. 2
- [4] FirstName LastName. The frobnicatable foo filter, 2014. Face and Gesture submission ID 324. Supplied as supplemental material `fg324.pdf`. 2
- [5] FirstName LastName. Frobnication tutorial, 2014. Supplied as supplemental material `tr.pdf`. 2