

Blackjack Assistant

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Android: Yes

Introduction:

Blackjack is a card game in which each player receives two face-up cards and plays against a dealer, who receives one card face-up and another face-down. Given a player's hand and the dealer's face-up card, there exists an optimal strategy for whether the player should "hit" or "stay" to beat the dealer's hand. Advanced players attempt to increase their odds against the house using this strategy. The average player, however, has not internalized the myriad actions to employ for all of the possible dealer and player card combinations.

The Android application we propose would help the Blackjack novice play one or several hands with the optimal strategy. The application would capture an image of the table, including player hands (for any turn) and the dealer's face-up card, and return the optimal action ("hit," "stay," "split," or "double-down") for each hand on the android phone display.

Implementation:

The basic image processing algorithm of the android application would act on a captured image of a Blackjack table, similar to the one shown below. There may be multiple player hands, and each may have two or more cards, depending on the turn. Some practical obstacles include: overlapping cards, various orientations of the cards on the table, and various camera positions and angles.



Image source: <http://en.wikipedia.org/wiki/Blackjack>

The proposed algorithm for processing the captured image would involve first thresholding the image and segmenting out all of the card ranks (since suits do not matter in Blackjack). Then, the rank images would need to be rotated and scaled so that they are all aligned regardless of original card orientation or camera position. These ranks can then be recognized using OCR and grouped with other ranks present in each hand based on relative positions. Once all of the cards have been recognized and

stored, the application would compare each hand to the dealer card using a basic Blackjack strategy look-up table to determine the action for that hand. The application will then display the optimal actions over the respective hands on the Android phone display.

We plan to first prototype the image processing algorithm in MATLAB. Then, we will move onto an Android application which captures images of Blackjack tables and displays the optimal actions overlaid on the original images. From there, a natural extension is to implement augmented reality on the application, where the viewfinder continuously captures the Blackjack table and overlays the appropriate actions to take for each turn in real-time.

References:

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