Based on the skeleton information, our algorithm first excludes the background and user’s occluding hand from the depth image, and then calculates the remaining pixels’ optical flows, which are mainly caused by the movement of the user’s head. Based on the results, we can correct the previous valid eyes’ positions until the eyes are not occluded anymore.

Using GPU, the computational performance of our system is consistently at 30 fps. A 12-participant user study also indicates that, by using our method, users are able to select 13.1cm-width on-screen targets with 95% accuracy, when they were standing or sitting at arbitrary positions in 1.6m ~ 2m away from the display.

3 Application: A Matching Game

We use a matching game, Candy Crush Saga1, as an application to demonstrate the usefulness and possible generalization of this technique. The object of this game is to make lines of three candies by selecting one candy and swapping it toward an adjacent one. An 7 × 7 grid of 15cm-width targets are shown on an 100-inch 4:3 projection screen with a Kinect sensor placed on its center bottom.

In this game, a user first selects a desired target by simply lifting his arm (Figure 1(a)) and then pointing at it (Figure 1(b)), as if throwing his finger touch to the display. Once a target is selected, the user can swipe the selected target toward its adjacent one to make the match (Figure 1(c)). No cursors and additional committing gestures are required during the selection. During playing this game, the user can freely move his position or sit down for more comfortable control. The user also can further alternatively use his another hand or even bi-manually use both hands for better performance. Multuser interaction is also supported in this game.

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References


1http://about.king.com/games/candy-crush-saga/