

# collecTable: a Natural Interface for Music Collections

André Maximo  
COPPE / UFRJ Brazil

Maria Paula Saba  
ESDI / UERJ Brazil

Luiz Velho  
IMPA Brazil



**Figure 1:** The *collecTable* running on the *iTable* (a), with several fiducials over it. The digital projections of the fiducials floating over the interface (b), each fiducial storing different music collections. The *M-Cube* interface for music data showing albums (c) and tracks (d).

**Introduction and Related Work** Tabletop and tangible interfaces have become common in recent years. Technology trends in this area can be found in commercial products, such as Apple's iPhone™ and Microsoft Surface™, as well as in research ventures, such as Reactable and Perceptive Pixel initiatives. Nevertheless, natural human computer interfaces (HCI) to support this hardware technology are still non-intuitive.

Our goal in this work is to provide a natural HCI software for music collection organization using multi-touch and tangible interaction. We built the interactive *iTable*, shown in Figure 1(a), to act as our tabletop and tangible hardware by employing the same technology used by the Reactable [Kaltenbrunner and Bencina 2007]. Our software – *collecTable* – is built on top of Apple's iTunes™, we read the music collection from its library described in XML, and we display and play the music albums in a similar way, using the cover flow and the player on the top of the screen, as can be seen in Figure 1(b). However, we employ multi-touch gesture for interaction with the cover flow and player widgets instead of using the mouse and keyboard, similarly to the iPod Touch, but enhanced with a tangible interface and physical objects.

The main contribution of this project is the Multi-dimensional Cube, dubbed *M-Cube* (or  $M^3$ ): a new visualization tool for n-dimensional databases. Although visual query languages exist [Stolte and Hanrahan 2002], they rely on simple regular graphic types for visualizing the data. Notwithstanding, we display the data in charts, as shown in Figures 1(c) and 1(d), where the axes can be naturally changed by touch and each face of the *M-Cube* is a combination of any two dimensions.

**collecTable** The *collecTable* is a music organizer software developed for the *iTable*, a natural interface which identifies multiple finger touches and physical objects. The multi-touch is used to manipulate the digital objects and send commands to the *collecTable*, while the physical objects, called fiducials, virtually store music collections and may be used to change between different user profiles. Figure 1(a) illustrates a finger touch dragging a music album from the cover flow in the center. In addition, multiple fingers can also be used to interact with several floating objects at the same time. Figure 1(b) shows some floating objects in our interface: the two stacked objects in the lower left corner are inactive fiducials out of the table, while the other three are active fiducials still on top of the table. Note that these three fiducials are of different types: the one on the left represents a music album; the slightly rotated one in

the center is a collection of music albums; and the one on the right is a collection of tracks.

The music albums or tracks can be dragged into or out of the active fiducials. When the fiducial is removed from the table, it becomes inactive and only its virtual imprint remains. While an inactive fiducial can still be dragged or removed by touch interaction, its contents are not displayed anymore.

**M-Cube** The *M-Cube* is a n-dimensional chart where each face shows a 2D chart. The X or Y axis may be changed by touch gesture like rotating the cube by hand. When rotating one of the axes, the other is fixed allowing a better browsing and understanding of the entire music collection. Each axis is one of the *M-Cube* dimensions. For the *collecTable*, we choose five dimensions for the track attributes on iTunes™ software: *artist*, *genre*, *play count*, *time* and *year*. In this way, our *M-Cube* has 20 different faces counting mirrored charts. Depending on the current dimensions on the X and Y axes, the *M-Cube* visualization can be music albums or tracks. Figure 1(c) shows the year  $\times$  genre chart, where all the tracks of a single album share the same attribute, therefore the *M-Cube* displays the albums. On the other hand, Figure 1(d) shows the artist  $\times$  time chart, where the tracks have different duration times and, hence, the *M-Cube* display the tracks.

The  $M^3$  is used in the *collecTable* to build playlists in a straightforward way. In contrast of the iTunes™ style to build playlists, where the attributes are filled on pop-up windows, the *M-Cube* allows track selection by touching attribute values and gesturing for browsing over different attributes. We believe it provides a more intuitive way for manipulating and visualizing n-dimensional databases, such as music collections.

## References

- KALTENBRUNNER, M., AND BENCINA, R. 2007. *reactIVision: A Computer-Vision Framework for Table-Based Tangible Interaction*. In *TEI '07: Proceedings of the 1st international conference on Tangible and embedded interaction*, ACM, New York, NY, USA, 69–74.
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