Foreign object detection in multispectral X-ray images of food items using sparse discriminant analysis

Non-invasive food inspection and quality assurance are becoming viable techniques in food production due to the introduction of fast and accessible multispectral X-ray scanners. However, the novel devices produce massive amount of data and there is a need for fast and accurate algorithms for processing it. We apply a sparse classifier for foreign object detection and segmentation in multispectral X-ray. Using sparse methods makes it possible to potentially use fewer variables than traditional methods and thereby reduce acquisition time, data volume and classification speed. We report our results on two datasets with foreign objects, one set with spring rolls and one with minced meat. Our results indicate that it is possible to limit the amount of data stored to 50% of the original size without affecting classification accuracy of materials used for training. The method has attractive computational properties, which allows for fast classification of items in new images.

Automatic measurement of orbital volume in unilateral coronal synostosis

Premature fusion of the coronal suture on one side of the calvaria (unilateral coronal synostosis, UCS) results in asymmetric craniofacial development and the deformation of the orbits. Often this necessitates surgery, where CT
scanning is employed to obtain measures of the bony orbit. These measures are typically computed by guided procedures that require expert time. We propose a method with higher degree of automation based on finding an optimal smooth closed surface. CT scans of 17 infants with UCS are included in our experimental validation, where we compare our method to expert guided segmentations. We obtain similar measures, as well as high Dice scores, compared to the experts. The run time for the proposed approach with a prototype implementation is around 3 minutes on a standard laptop, making the method suitable for rapid evaluation of orbital volume in UCS.

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VirtualTable: a projection augmented reality game
VirtualTable is a projection augmented reality installation where users are engaged in an interactive tower defense game. The installation runs continuously and is designed to attract people to a table, which the game is projected onto. Any number of players can join the game for an optional period of time. The goal is to prevent the virtual stylized soot balls, spawning on one side of the table, from reaching the cheese. To stop them, the players can place any kind of object on the table, that then will become part of the game. Depending on the object, it will become either a wall, an obstacle for the soot balls, or a tower, that eliminates them within a physical range. The number of enemies is dependent on the number of objects in the field, forcing the players to use strategy and collaboration and not the sheer number of objects to win the game.

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