

Mobile Food Intake Visualization and Voice Recognizer (FIVR)

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Inadequate dietary intake assessment tools hamper studying relationships between diet and disease. Methods suitable for use in large epidemiologic studies (e.g., dietary recall, food diaries, and food frequency questionnaires) are subject to considerable inaccuracy, and more accurate methods (e.g., metabolic ward studies, doubly-labeled water) are prohibitively costly and/or labor-intensive for use in population-based studies. A simple, inexpensive and convenient, yet valid, dietary measurement tool is needed to provide more accurate determination of dietary intake in populations. We therefore propose a three-phase project to develop and test a new assessment tool called FIVR (Food Intake Visualization and Voice Recognizer) that uses a novel combination of innovative technologies: advanced voice recognition, visualization techniques, and adaptive user modeling in an electronic system to automatically record and evaluate food intake. FIVR uses cell phones to capture both voice recordings and photographs of dietary intake in real-time. These dual sources of data are sent to a database server for recognition processing for real-time food recognition and portion size measurement through speech recognition and image analysis. The user model will allow for enhanced identification of food and method of preparation in situations that images alone might not produce accurate results as the system learns through experience and adapts to the individual's food patterns. Objectives are to fuse existing voice and image recognition techniques into a system that will recognize foods by food type and unique characteristics and determine volume by film clip showing an image from at least two angles. The item identified will be matched to an appropriate food item and amount within a food composition database and nutrient intake computed. Researchers will be able to view the resulting analysis through an adapted version of the dietary analysis program, ProNutra. The proposed protocol will incorporate three discrete phases: 1) technology development, integration, and testing; 2) validity testing with a controlled diet (metabolic ward study); and 3) real-world utility testing. Validity of the data collected will be judged by how closely the nutrient calculations match the known composition of the metabolic ward diets consumed. FIVR has the potential to establish a method of highly accurate dietary intake assessment suitable for cost-effective use at the population level, and thereby advance crucial public health objectives.