

# A Study of Visual Attention in Diagnosing Cerebellar Tumours

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**Abstract**—Visual attention allows user to select the most relevant information to ongoing behaviour. This paper presents a study on; i) the performance of people measurements, ii) accurateness of people measurement of the peaks that correspond to chemical quantities from the Magnetic Resonance Spectroscopy (MRS) graphs and iii) affects of people measurements to the algorithm-based diagnosis. Participant's eye-movement was recorded using eye-tracker tool (Eyelink II). This experiment involves three participants for examining 20 MRS graphs to estimate the peaks of chemical quantities which indicate the abnormalities associated with Cerebellar Tumours (CT). The status of each MRS is verified by using decision algorithm. Analysis involves determination of humans's eye movement pattern in measuring the peak of spectrograms, scan path and determining the relationship of distributions of fixation durations with the accuracy of measurement. In particular, the eye-tracking data revealed which aspects of the spectrogram received more visual attention and in what order they were viewed. This preliminary investigation provides a proof of concept for use of the eye tracking technology as the basis for expanded CT diagnosis.

**Keywords**— eye tracking, fixation durations, pattern, scan paths, spectrograms, visual.

## I. INTRODUCTION

THE need to understand how people acquire information from pictures-radiographs, maps, charts, photographs, drawings, and other static images can be an important component in understanding, aiding, and eventually automating a wide range of diagnostic tasks [1,2,3]. Individuals differ from one another in their success at identifying disease from medical data; for example, using Magnetic Resonance Spectroscopy (MRS) to measure the relative quantities of chemicals present in the brain and applying these estimated quantities to a decision algorithm, gives an indication of the presence and type of a Cerebellar Tumour (CT). In this study, the investigation is conducted by using an eye-tracking system to investigate people measurement performance and explore how accurately people measure the peaks on the MRS graphs that correspond to chemical quantities.

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## A. Background

Decision algorithms are devised to assist CT diagnosis during inspecting MRS graphs. An example of an MRS graph is given in Fig. 1, showing peaks for the constituents of interest.

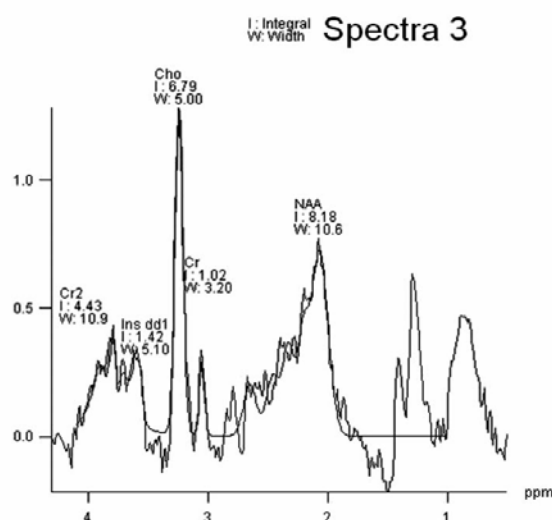


Fig. 1 An example of an MRS graph showing the relative quantities of Choline (Cho), Creatine (Cr), N-acetyl aspartate (NAA) and Inositol (INS) as spectra peaks

After measuring the peaks, a decision algorithm (Fig. 2) can be applied which requires quality control checking to determine the suitability of MRS. If the MRS graph is satisfy the quality control criteria, the ratios of the constituent peaks can be calculate in order to select the diagnosis.

## II. METHOD

Experiments were designed and built using SR Research Experiment Builder [4]. During the experiment, the participants were seated directly in front of the display monitor. The position of gaze was recorded at 50 ms intervals. Their viewing distance was approximately 45.7cm from the screen. Then, they were requested to look at the spectrograms and estimated peaks of Inositol(Ins), Choline(Cho), Creatine (Cr) and amino acid N-acetyl aspartate (NAA).Two experiments were performed, first with synthetic graphs and