Effects of visual evoked potentials in random sequence

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Abstract: VEP is an important tool for the study of EEG, visual evoked potentials study focused on the use of visual evoked potential analysis of the various components, but for the main component of the visual impact - the picture on the visual display sequence impact is rare, this article from a different picture placed the order, we studied the impact sequence of visual research.

Introduction

EEG is a series of brain bioelectrical reaction was triggered by external stimuli is a weak signal acquisition-related instruments acquired EEG analysis can reveal the thinking brain activity associated with, so a lot of psychological and biological research team EEG team regarded as a source related research, such as studies of brain-computer interface, the EEG applications to help people with disabilities live on the use of EEG can make them through the brain controlling peripheral machinery and equipment, for example, to detect mental illness, through the EEG analysis, the different components of the pathological and normal brain waves, so as to establish disease detection model.

EEG studies, which is a critical feature extraction step, EEG signal because it is weak, it will be the annihilation of the noise characteristics of the data, how to extract the steady and significant EEG source of stimulation is the key visual evoked potentials of the brain caused by a kind of visual stimulation EEG, EEG is a stable, so a lot of the research team are visual evoked potential as a tool to carry out related research, visual evoked potential through a series of pictures , lighting and other visual stimuli, constantly changing the order to cause a reaction of subjects, which is a typical P300 VEP component.

Research potential ordinary visual evoked, all according to some random sequence, or to highlight the difference between the target stimuli according to some particular sequence triggered EEG, photo paper as stimuli, visual evoked potentials study the data results. From the difference between the fixed sequence and random sequence, the difference between non-starter receive photos and photos, as well as the difference between each stimulus photo directly display the same number and a different number of visual evoked potentials to study the sequence of EEG analysis results

Test mode

Experiments in Jiangxi University of Science and Information Technology Institute BCI lab, subjects of Jiangxi Institute of Technology students, subjects were placed in a quiet interior shield, sitting on soft chairs without armrests experiment, during the experiment, the subjects according to the experimental requirements, looked at the front of the computer screen related operations, 15 experimenters were divided into three groups of five.

During the experiment, a stimulus program will display a different picture in the middle of the computer screen, each experiment there are five different photos displayed to the experimenter, photos show display in a random manner, each photo is displayed on the screen 1000ms, after 250ms black screen appears, a single experiment took 1250ms, each experiment five photos random 370 times, the same number of each photo appears. In front of the experimenter presented five photos, including a photo experimenter himself and four background photos, each photo is select the experimenter head in the same context (over the shoulder) as experimental material. Depending on the experimental background and purpose of comparative experiments, each experimenter experimental comparative test includes five modes:

1 photo is placed in sequence experimenter first position, and the remaining four random background photo display;

2, the experimenter and background pictures are random order;

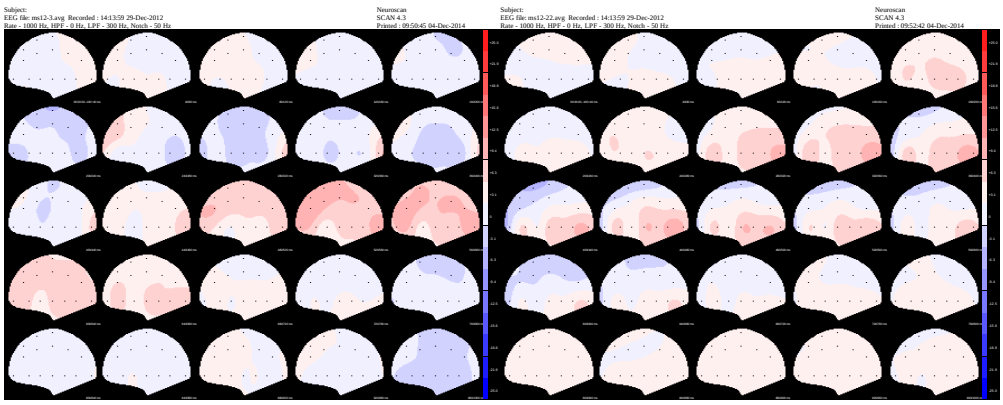
3, experimental five photos for a fixed order;

4, experimental five photos show the same number of times each experiment;

5, the experimenter's photos appeared a small probability event.

Results

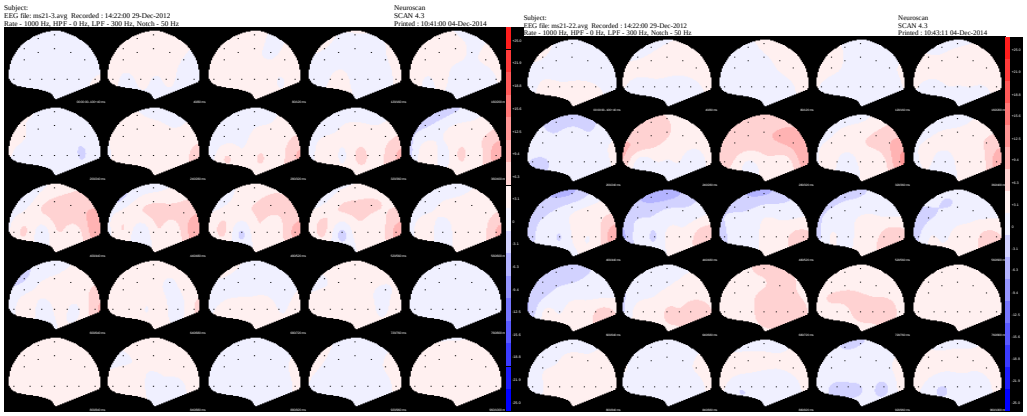
When the experimenter set photos in the first place, the experimenter experiments, the first time to see their photos, and then will see other people's photos, EEG features and experimenters first time such a test mode to see the photo is collected under the random pattern of brain signals to form a set of comparative experiments, Figure 1 (a) is the experimenter to chart your own photo in the first place EEG set mode, 1 (b) is an experimental who do not put their pictures on the EEG view of a location can be seen from the comparison chart, after several superimposed on average, the subjects began in the middle of the second row position, the subjects brainwave response was significantly higher randomly placed in brain response.



(a) (b)

Figure. 1 Whether the goal is to give top priority to set the picture

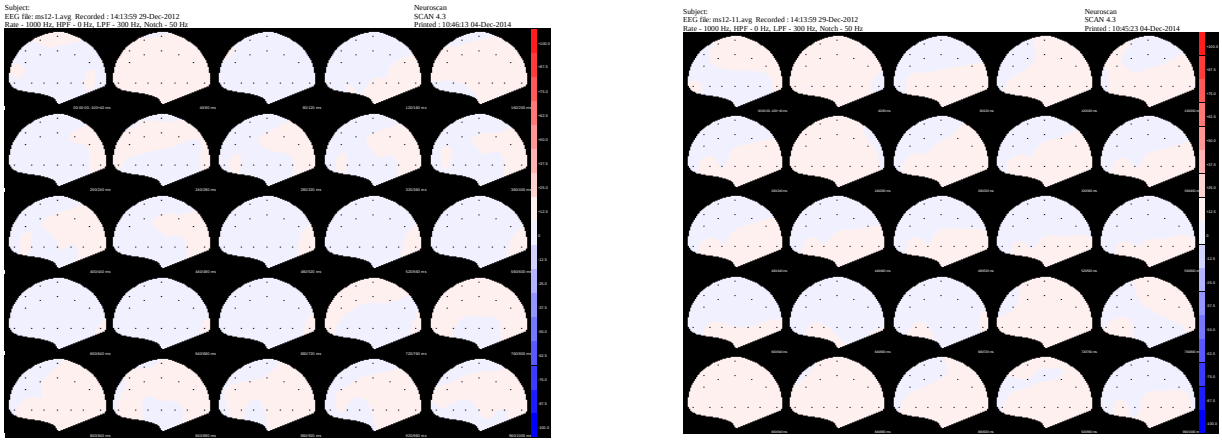
When the experimenter during the experiment five photos are fixed sequential and random order, whether due to the factors that the experimenter can guess the next photo, the experimenter whether EEG groups will have an impact? In this paper, the two groups were compared with experimental mode, the time when the photograph is a fixed order, and during the experiment subjects will self lessons, make certain guess a picture, so late (600ms later) will appear again a active, as shown in 2 (b) shows, but in a random probability, it is difficult to guess the subject to the law of the photo appears, therefore Figure 2 (a) shows, does not appear appropriate active period.



(a) (b)

Figure. 2 Comparison chart under fixed probability

In small probability, due to the presence of a desired subject, and therefore produce significant P300, but at equal probability, the corresponding brain wave component is not so obvious, but in order to stimulate the next picture, whether there is a gap of ? In this paper, the probability factors for the corresponding comparative test, as shown, when the experimenter in both sets of comparative experiments, in addition to 300ms occurred during a certain difference, but other components, and failed to appear significantly different .



(a) (b)

Figure. 3 Comparison Chart of random probability

Conclusion

VEP is a major source of EEG studies, because features stable, highly reproducible and has been widely used in many areas of research, and other sources of different stimuli, the photo has its uniqueness in the study of specific EEG of the process, the photo-related experiments on physical design, whether it would affect the experiment is a major purpose of this study, this article is designed to compare the five experimental models, analyze differences in brain mapping photo analysis tool, the finally obtained three pairs comparison chart distinction.

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