Brains and Chips: A System for Analyzing Imagery

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In light of the intelligence failures associated with weapons of mass destruction (WMDs) in the lead up to the U.S. lead invasion on Iraq, DARPA commissioned several universities and private institutions, including the University of Utah, to come up with an effective way to study imagery analysts in order to find ways to cut out such imagery failures. At the University of Utah we formulated an EEG system that would study imagery analysts' brainwaves to see what signature patterns we would pick out when they detected salient changes in the images. We knew that if we could find a pattern in neural activity when an analyst was viewing important changes in imagery, we would be able to design a system that watches for these same patterns. This system would indicate which images should be viewed in greater detail and which should be thrown out.

We studied this by presenting experts and novices of imagery analysis with a series of 120 sets of reconnaissance images. Each image in the set fell into one of four categories that examined different types of imagery that typically would be presented to an analyst. Each participant was hooked up with a series of 11 electrodes on the face and scalp that recorded their brainwaves as they saw each image set.

What we have found has been very promising. There appear to be two distinct waveforms that process brain regions that we are observing in the task. There also seems to be a clear distinction between each of the four categories, indicating to us that there is indeed a signature wave pattern associated with viewing salient changes in imagery. We were surprised to find little difference in the brain patterns between novices and experts but discovered that this might be to our advantage in supporting the newly found brainwave signatures.

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