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ПИ РАО**,** ул**.** Моховая**,** д**. 9, 2-**й этаж**,** Малый зал

Доклад на английском языке
с резюмирующим переводом на русский

It's all in the eyes: What eye movement analysis can tell us about attention and cognitive state

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The early eye tracking studies of Yarbus (1965) provided descriptive evidence that an observer's task influenced patterns of eye movements, leading to the prospect that an observer's intentions could be inferred from their saccade behaviour. If task influences eye movements in any systematic fashion, then it should be possible to determine the task of an observer using eye movement attributes alone. In the first part of my talk, I will show data on how we can use descriptive and computational analysis to spot bottom up, mid-level and top down attention artifacts within eye movement patterns of visual search. In the second half of the talk, I will show how we can use these saccadic properties to infer higher level cognitive states using machine learning classifiers and clustering. Recent attempts at such a classifier, however, have had mixed results at determining tasks above chance levels. So our approach is to train a classifier using eye movement data which has previously been shown to differ across task: Dodd et al. (2009) observed Inhibition of Return (IOR) in a search task but not in viewing, preference or memorization tasks. More than 17,000 saccades from 53 participants and 67 photographic images were used to train multiple Bayesian classifiers on saccadic attributes such as latency, duration, peak velocity, amplitude and relative amplitude of sequential saccades. The first classifier was trained with, and then used to classify based on, mean saccadic attributes for a given trial while a second classifier was trained and tested using properties of individual saccades. Both classifiers were able to predict task at above chance levels overall, but the preference task consistently remained at chance. We were also able to improve the performance of the classifier using structured Bayesian networks over Naïve versions of the algorithm. Finally I will present a generative model of eye movements which is based on this classifier and accounts for the transition between cognitive states without a homunculus.