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### **A novel algorithm for semiautomatic brain structure segmentation from MRI**

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On a daily basis, numerous medical institutions use MRI segmentation to conduct research and treat patients. While there are many different segmentation algorithms that exist today, most have drawbacks in respect to either efficiency or accuracy. We present an algorithm that utilizes our unique seeding procedure and integrates several of these methods to achieve robust semiautomatic segmentation on MRI that can be done efficiently on modern CPUs. The seeding method is characterized by a progression of k-Means clustering, connected components searches, and mathematical morphology iterations in order to achieve a seed that closely resembles the target shape to be segmented. The seed is then translated into a level set equation and evolved according to a hybrid k-Means/level set force equation until the target shape is reached. Due to our seeding method, this deformation suffers from far less local minima than had we used a generic seeding procedure. Also, because the seed is near the target shape, the computational complexity is drastically reduced while evolving the level set to its steady state. The entire process requires a single mouse click from a user inside the target region and is done on one slice of an MRI scan in two dimensions.