When deep learning is inferior to other methods

RSIP Vision's CEO **Ron Soferman** has launched a series of lectures to provide a robust yet simple overview of how to ensure that computer vision projects respect goals, budget and deadlines. This month we will report the key points from Ron's lecture at the **Boston Imaging and Vision**, during an evening dedicated to **N3CV (Non-Neural-Network Computer Vision)**.

"In this case, we should not use deep learning!"

We will dedicate this talk to gain some understanding of when to use **deep learning** in a project and when it's preferable to use **non-neural network computer vision technology**.

Let's start by acknowledging the fact that deep learning is a real revolution in computer vision. Like the Gold Rush, we find that many people are going in this direction and trying to find opportunities there. Most of the academic efforts are done in this direction. Between 80% and 90% of the papers that are published in the conferences and all of the oral papers come from the deep learning area. Also, industry is reexamining the current product and their algorithms with this new approach. We can see that there is a big wave of startups that have based their technology on deep learning.

First of all, deep learning is, of course, **the best way to do classifications**. Also, in the last year we found that fully convolutional neural networks are very efficient in segmentation as well, especially when segmentation is more complicated. This means that, far from being a very simple problem, it requires context and a lot of knowledge.

We find that in the medical area, by using detection in CT images, we can find lesions and other problems. It can really give a boost to the radiologist's work. There are more and more applications every day.

We have to take into account that there is a **high computational cost**. The dataset requirements may be problematic especially when we start the development, and for any medical application, we know there is very slow FDA acceptance for this new methodology. In summary, we can say that when there is a task of detection and recognition of a complicated object, we will surely start with deep learning.

On the other hand, when we have some good mathematical grasp of the problem with regards to **physics, optics, or even physiology**, other methods will work much better. We can use it at least in some places where we can start with non-neural network computer vision technology. First of all, for any exact measurements, we will use it. Also, all of the knowledge of the 3D reconstruction including the projection, the camera model, etc. is done solely by geometric calculation and not by deep learning at all.