Scientists investigate use of cognitive computing-based visual analytics for skin cancer image analysis

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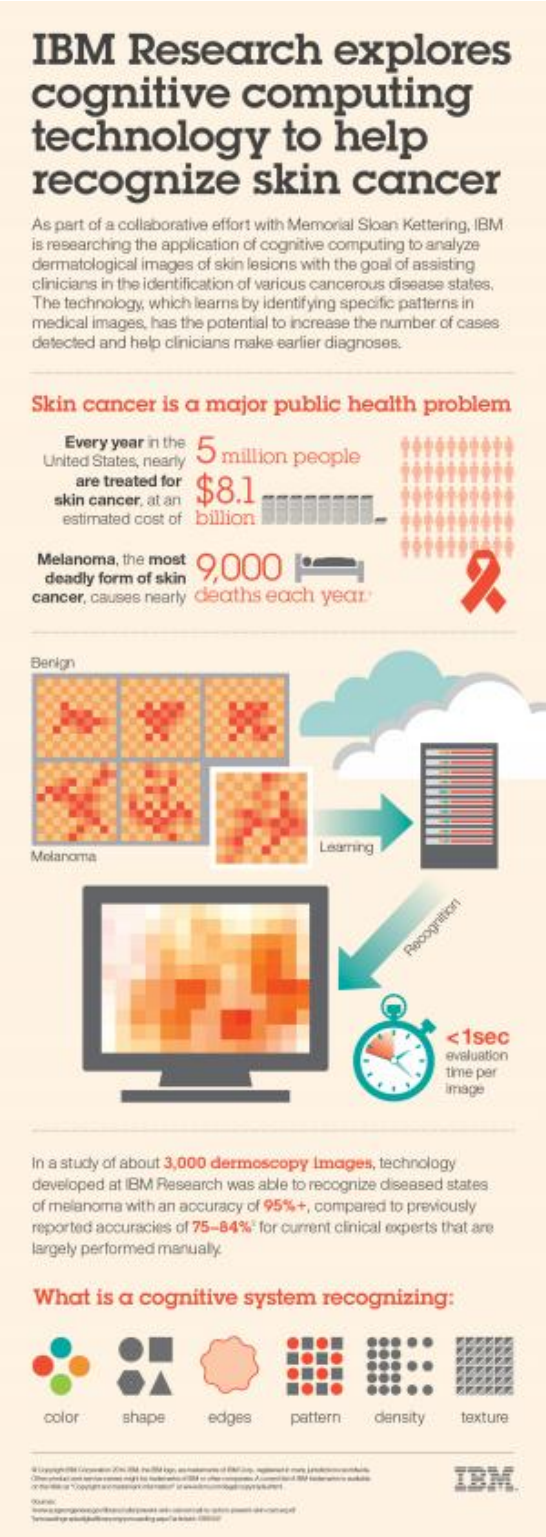

As part of a collaborative effort with Memorial Sloan Kettering, IBM is researching the application of cognitive computing to analyze dermatological images of skin lesions with the goal of assisting clinicians in the identification of various cancerous disease states. The technology, which learns by identifying specific patterns in medical images, has the potential to increase the number of cases detected and help clinicians make earlier diagnoses. (Credit: IBM)

IBM announced today a collaboration with Memorial Sloan Kettering to research the application of cognitive computing to analyze dermatological images of skin lesions with the goal of assisting clinicians in the identification of various cancerous disease states. The technology, which learns by identifying specific patterns in medical images, has the potential to increase the number of cases detected and help clinicians make earlier diagnoses.

Despite efforts to address risk factors, skin cancer is still the most commonly diagnosed cancer in the United States with nearly 5 million people treated for the disease every year, at an estimated cost of $8.1 billion. Melanoma, the most deadly form of skin cancer, causes nearly 9,000 deaths each year.

The automated analysis of skin imaging is one area of research that is currently being investigated by IBM Research, in conjunction with a larger international effort being led by Memorial Sloan Kettering.

Dr. Allan Halpern, Chief of Dermatology Service at Memorial Sloan Kettering, said "Skin cancer is a major public health problem. Treatment options exist, with the best outcomes attained through early detection. However, accurately distinguishing the earliest cancers from concerning benign lesions can be very challenging even for dermatologists, so having the aid of analytics that can recognize medical images and detect small variations over time could vastly improve patient prognoses."

Currently, diagnostic accuracy varies widely across clinicians, institutions, and the availability of expertise. Even when the appropriate expertise is available, diagnostic accuracy is estimated between 75-84%. Critical evidence in these images is often subtle, requiring experience and careful measurement to recognize. Using cognitive visual capabilities being developed at IBM, computers can be trained to identify specific patterns in images by gaining experience and knowledge through analysis of large collections of educational research data, and performing finely detailed measurements that would otherwise be too large and laborious for a doctor to perform. Such examples of finely detailed measurements include the objective quantification of visual features, such as color distributions, texture patterns, shape, and edge information. Algorithms could also measure temporal morphological progression of lesions (such as aggressive growth over a short span of time), or deviations from what is considered normal for a single patient or sub-population. Combinations of these types of analyses could identify for the clinicians, nuanced patterns in dermatological images that may signify disease.

Preliminary experiments have been performed using a controlled research dataset of dermoscopy images (a specialized imaging technique used by dermatologists) containing over 3,000 cases of melanoma, atypical lesions, and benign lesions. In this dataset, the technology developed by IBM recognized diseased states with a performance of 97% sensitivity, and 95% specificity.

"Given the incredibly high incidence and mortality rate of skin cancer, there's a real opportunity to have a clear and significant impact on the health and longevity of individuals on a global scale. At IBM, we are uniquely equipped to help tackle this problem with our expertise in cognitive computing, including machine learning and visual analytics," said Dr. Noel Codella, IBM Research Staff Member, and IBM Technical Coordinator for the collaboration.

Provided by IBM