Sixth Sense and CrestOptics: Machine Learning applied to images
A new collaboration to develop Machine Learning algorithms for accurate microscopic imaging

Rome, 11 February 2021 – **Sixth Sense**, Italian company specialised in the development of digital data analysis products and solutions, and **CrestOptics**, leading Italian company in the development and production of advanced imaging systems for Microscopy and Diagnostics, have today announced the start of a fruitful collaboration aimed at **developing innovative Machine Learning techniques for the acquisition and processing of very high-resolution microscopic images**.

The collaboration leverages on Sixth Sense's expertise in developing Machine Learning algorithms to extract insights from big data, and CrestOptics' expertise in producing advanced Microscopy imaging systems, bringing together their respective **engineering teams** to build a device and Machine Learning algorithm that will **enable the acquisition of super-resolved microscopic images**.

Through the application of Machine Learning algorithms, it is possible to teach the software to recognise the key characteristics of the desired image, to optimise its parameters and to improve its quality, providing researchers and biologists with **the most accurate image possible**, thus **minimising analysis times and potentially expensive hardware investment costs**.

The research will be made up of **two phases**. In the first phase, an artificial intelligence approach will be introduced to refine the pseudo-deterministic algorithms developed by CrestOptics for structured light systems, while in the second phase, these algorithms will be entirely replaced by a machine-learning algorithm capable of associating the set of structured light images with the corresponding super-resolved image. This machine-learning approach will be an integral part of CrestOptics' high-end product range for the super-resolution market.

Raino Ceccarelli, Head of Product Development CrestOptics, stated: "*For the first time, Crestoptics will use Machine Learning in the development of its products. Our company's know-how has always been aimed at improving the performance of a traditional microscope with hardware and software solutions, but it is with the results we will obtain from this collaboration with Sixth Sense that researchers around the world will be able to answer fundamental biological questions on ever smaller scales of time and space.*"

Gianluca Nastasi, Chief Technology Officer and Co-founder di Sixth Sense, said: "*We have already been working with companies in the healthcare industry to contribute to innovation and the future of medical, pharmaceutical and biological research. The use of advanced Machine Learning and Deep Learning tools and techniques is increasingly crucial in the field of imaging systems for microscopy and diagnostics, as it not only benefits the daily work of researchers, but can also positively impact the work of doctors, healthcare professionals and, most importantly, the health of patients.*"

A distinguished aspect of Machine Learning is its **dynamism**. These mathematical models, in fact, receive a series of data which are able to learn, modify and improve the predictions as they receive more information on what they are elaborating. Thus, through learning, the Machine Learning algorithm developed will be **able to progressively minimise errors, maximise the probability that predictions are correct and provide an increasingly accurate reconstruction of the super-resolved imag**e, thus providing a microscopic image of much higher quality than the one which could be provided by a microscope not equipped with this technology.

Super-resolution images will not only play a key role in basic research on cell preparations, but will also be instrumental in accelerating the generation of biomedical and diagnostic results.

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Sixth Sense
Sixth Sense is an innovative Italian company specialising in the development of digital products and solutions that allow data to 'speak for itself'. The Sixth Sense team, based in Italy and in the UK, leverages its cutting-edge expertise in Data Analytics to develop advanced algorithms and predictive artificial intelligence technologies that extract information from data (e.g., Deep learning) and to design hardware and software systems for Big Data solutions. Sixth Sense has built an extensive network of relationships with international partners in Europe, the U.S and China, and heavily invests in R&D to perfect the creation of innovative products that enable automatic analysis and extraction of information from data.

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CrestOptics
CrestOptics is an Italian company leader in the development and production of advanced systems and applications for Diagnostics and Fluorescence Microscopy. CrestOptics' technology supports the research and industrial community with highly customised solutions through continuous improvement of engineering and R&D strength. CrestOptics' team of physicists, biologists, engineers, designers and technicians has made it possible to develop the right know-how to build high-end confocal systems, which are essential for researchers today. The company also boasts several new projects conceived within the Joint Lab, a scientific and technological collaboration built with the IIT, and relies on a network of experienced distributors who continuously support scientists in research laboratories around the world.

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