Artificial intelligence in the e-waste sorting process

The increasing use of electronics creates a giant waste mountain. Together with e-waste recycler Recupel, researchers from imec and the University of Antwerp are developing software to enable automatic recognition of small electronic devices like mobile phones, home appliances, radios, computers and DVD players within this waste mountain. In order to automate the sorting process further, Artificial Intelligence algorithms come to the rescue.

Artificial Intelligence and the 40,000-tonne mountain of e-waste

Today, processing plants still sort electrical and electronic devices the old-fashioned way, using the human eye. This offers the advantage of ensuring that the sorting is done precisely, and the recycling goes smoothly. Sometimes, a producer requests specific devices of a particular brand or type, to reuse specific materials or parts to create new ones.

But sorting through 40,000 tonnes of e-waste per year is a lot of work. In order to develop a way to speed up this process, a collaboration was set up between imec, the University of Antwerp and e-waste recycler Recupel. IDLab, an imec research group the University of Antwerp has vast experience with Artificial Intelligence, and that technology appeared to be the solution for Recupel's problem. Making use of deep learning techniques, a smart recognition system was set up, that is being used in-line at the recycler and that is being constantly improved to make the recognition more precise and reliable.

How do you sort e-waste accurately with AI?

Sorting has to be done carefully. Kind by kind. Brand by brand. Type by type. But can a camera eye do that without human intervention? The first thing we had to do was make the camera smart. And we did that by using all the photos of e-waste from the past five years to build up a memory store for the camera. This involved over one million photos. Special image recognition software developed by IDlab has to not only distinguish different types of small e-waste, but also specifications such as the brand, type and year of manufacture.

E-waste occurs in all kind of forms and most of the time, it is broken. Modern techniques allow us to still detect the objects or even brands. This allows the recycler to have more insights in the appliances to recycle, and he can take actions to improve the recycling process, which is very specific for each product. By applying computer vision techniques, e-waste could be categorized for different recycling categories automatically and so, the sorting process becomes both more efficient and fast.