Sense and sensor ability: How AI and connectivity will help each other grow

Connected devices are getting smaller, cheaper, and more specialized. While connected systems as a whole are getting more intelligent, the actual processing power of these devices is not expanding at the same rate - opening up a host of issues for enterprises wanting to enter the IoT, or expand their current IoT fleet.

The development of new network technologies will require a new way of processing data from a huge range of sources, and communication between multiple systems (even in one enterprise) will soon become too complex to be easily managed. Therefore, the telecoms environment could be the ideal testing ground for artificial intelligence, with the huge amounts of data that AI can use.

By building on these two technologies 'self-learning' networks of IoT devices can be created. With real-time access to such a huge pool of data, AI can then be applied to any number of mission-critical environments, with the confidence that it has been tested in a controlled environment.

Connecting intelligently

AI is already used by telcos to help secure their traffic and maintain infrastructure - AT&T analyse drone footage using AI to help predict (and preempt) when towers need to be repaired - but as of yet AI has not been used to improve communication between machines. The connectivity modules or the sensors themselves are not smart enough to handle AI programs, but advances in edge computing mean that gateways between devices and the cloud are getting smarter and smaller by the day.

Equipping an edge gateway with AI then would give access to an almost unlimited amount of metadata, such as device behaviour and identification, which would allow some of the most time-consuming interactions to be automated. Processes such as network selection, outage detection and spectrum spreading (in LPWAN technologies) can all benefit from Machine Learning techniques, the only issue is how much data is available locally from which AI can learn.

MVNOs (Mobile Virtual network Operators) are therefore in a privileged position, with complex network infrastructures to manage, no proprietary infrastructure, and a history of selecting the best data path for their clients. Various network-switching techniques exist, and some newer technologies will really give AI something to sink its teeth into.

Multi-network SIMs are in use around the world, but businesses are starting to take notice of more advanced network-switching methods to suit their needs. Multi-IMSI (International Mobile Subscriber Identity) connectivity allows the SIM to access a completely different network infrastructure, so data is not routed through a 'single point of failure' and the SIM can connect even with an outage at the top operator tier.

Multi-IMSI technology can also be programmed onto one 'slot' of the eUICC standard. eUICC SIMs have distinct SIM profiles, and can fall back to a 'bootstrap' profile that is needed to add networks over the air (OTA). With a multi-IMSI bootstrap, users have a resilient 'failover' profile that is not tied to one operator - especially important for embedded eUICC SIMs that must be provisioned at the point of manufacture, regardless of where the device will be used.

Maximum resilience is ideal for mission-critical, remote, and roaming applications, but others need even more flexibility. Sigfox's hybrid chipset, announced late 2017, connects LPWAN technology, NB-IoT, and LTE-M. This means a device can transmit basic information on the Sigfox ultra-narrow band, and switch to a cellular network to send larger data packets - such as those aggregated by an intelligent edge gateway. Recognising these data packets and allocating them to the right network band could be a great test for AI, and could show us what a truly smart network might look like.

Understanding AI

AI has yet to progress to a level where we can safely use it to help us in sensitive situations - like diagnosing patients, passing sentences in court, or driving for us. But this doesn't mean AI isn't capable, on the contrary, by imitating neural networks in human brains deep learning techniques can already make decisions independently - the problem is that if we use unsupervised deep learning we don't know how these programs reach their decisions.

Because the telecoms environment is so structured (even if these structures are incredibly convoluted) and every part of the data behaviour is measured and available to operators or MVNOs, we could use supervised machine learning techniques to improve the network and move to deep learning when ready.

Living and learning

When applied to a big data source, such as telecoms, AI will move from strength to strength, and we will learn more about how it can function within a diverse and changeable environment,. We can expect that AI will follow a similar trend to IoT technology, becoming more available, cheaper and more intelligent as more people adopt it, meaning that a self-learning network may truly be possible - and AI might soon be capable enough to work with more critical applications.

Whether this will assuage people's fears about AI taking over the world remains to be seen, but as the business environment becomes more competitive, as technology comes down in price, and billions of new devices are connected to the IoT ecosystem, we will need something to help us make sense of it all.