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Creative visualisation (Part 2)

In the second of a three-part review of the AGI's Foresight Report 2020, Graham Wallace explores how organisations are exploiting massive computing power and leading edge visualisation techniques to turn challenges into opportunities

While many factors, as noted in the first part of this column, will impact on the realm of the cartographer, for Foresight Report 2020 contributors such as Chris Little of the UK Meteorological Office (UKMO), they are all part of business as usual. Indeed, it is worth reflecting that meteorological organisations at home and abroad operate some of the world's largest computing facilities and are adept at handling Petabytes and even Exabytes of data.

Shaping and taming data

Perhaps more important are the skills used to shape and tame this data for scenario modelling and the forecasting of extreme events. This work employs conventional 3D data covering wind velocity, temperature, pressure supported by a variety of temporal readings to

The UKMO Global and Regional Ensemble Prediction System (MOGREPS-G and MOGREPS-UK) aids the probability forecasting of rapid storm development, wind, rain, snow and fog. This image shows the probability of six hour rainfall exceeding 10mm, with the left forecast being from MOGREPS-G and the right forecast being from MOGREPS-UK. Both forecasts are valid at the same time (for a day in February 2017) and use the same probability contour legend (greens highlight the lowest probabilities and blues highlight the highest probabilities). In the UK ensemble, the model parameters (temperature, pressure, wind, humidity, etc.) are forecast at grid points separated by about 2.2 km, and the model has 70 vertical levels. Image: UKMO

generate a 4D solution set. The strength of the approach used by the UKMO lies in the creation of a fifth dimension, namely the ensembles that assess the expected probabilities of each outcome. This activity is well suited to Big Data processing.

However, the real skill comes in the use of predictive analytics to interpret real-time data feeds and to compare this information with the predicted ensembles – fine tuning the forecast – resulting in a 6D solution. The inclusion of additional data such as air quality and cloud cover enhances the picture, but it is not complete until the impact of external factors such as solar activity and the interaction of the "Air" model with the "Ocean" model is considered to create a 7D solution.
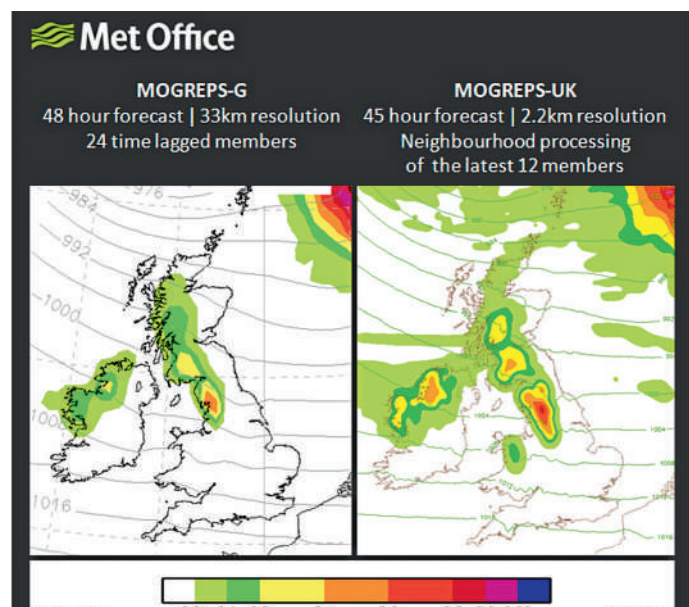
Managing this level of complexity requires a clear approach to data management. But there are other lessons to be learned. The data processing requirements of the Film and Computer Games industries ae similar to those of UKMO and its overseas counterparts, but they are complemented by a strong focus on creative visualisation involving the use of images to process large amounts of data to tell a story.

Seeing is believing

Richard Kemp-Harper (formerly with ITO World and now Managing Director of Kemp Harper Associates) explored this theme more fully in his Foresight Report 2020 paper. He highlighted that data visualisation techniques offer the potential to create a step change in how tools can support the processing of large datasets. Essentially, the underlying reason for this is that, of all the human senses, sight has by far the greatest bandwidth. Danish physicist Tor Norretranders has estimated this at over one gigabit/second, a speed that enables the human brain to process images up to 60,000 times faster than text.

This has important implications when it comes to presenting information and highlights the versatility of using creative visualisation to tell a story. The combination of massive amounts of computing power with leading edge visualisation techniques improves the ability of human analysts to interpret and derive insight from large quantities of data. The analysis of time series data, the analysis of patterns and identification of anomalies relative to expected benchmarks and KPIs enables vast quantities of data to be assessed and evaluated.

In the next issue, Graham Wallace considers how the stage is being set for the emergence of a new breed of communications centred on "Digitally Aware Creatives"