NAME :Hiroshi YOSHIDA
COUNTRY : JAPAN
REGISTRATION NUMBER : 7325

GROUP REF. : C2
PREF. SUBJECT :PS2
QUESTION N° : Q2.6

Question:
How can artificial intelligence be harnessed to provide further support such as recommending courses of action for operational decision-makers?

Direct answer:
In Japan, not only providing insights to assist operation staff, but also the automation of control is realized in some domain so called SPS or RAS. In order to realize this, we have a scheme to periodically check whether the difference between the calculation result of the system and the actual operation result is within the error that can be tolerated by the operator.

In Japan, automatic control by intelligent system is realized, which maintain transient stability, adjust voltage in emergency condition or shed some loads and trip some generators to maintain separated grid frequency, etc. For example, ISC system, stands for "Integrated Stability Control system", is one of the implemented system.

In the ISC system, the grid status is reproduced on the system in real time at every 10 or 30 seconds depending on calculation function. If the risk with fault on the grid (generator step-out, voltage abnormality, system separation, etc.) is calculated, the system also calculate the countermeasures for each contingency. When fault on the grid occures, the countermeasures are automatically taken to prevent risk actualized.

Countermeasures to be implemented are following. Generator tripping, load shedding, or connecting /disconnecting capacitors or reactors etc.

In order to ensure the accuracy of the automatic control, the difference among reproduced models and actual grid are checked in appropriate timing whether error level is within acceptable or not.

We have two reproduced models, one is simple and rapid to calculate running on the ISC system and the other one is detailed and more accurate but needs more time.
The ISC system have the function to make the snapshot data for both these two models. So we can check for specified time cross section the errors are within a certain or not.

Whether detailed model is acceptable or not for automation is checked when a major fault in real gird occurs. We have installed many measurement equipment in grid. If a fault is detected, they start logging, for example P, Q, V, F.
Also we reproduce time cross section with a fault on detailed model and check the difference between the measured data and reproduction result is within a certain level.

With confirming the difference between the behavior of the actual gird and the detailed model, and the difference between the detailed model and the simple model, finally the control by the system is allowed to be automatically executed.