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Rough forecast damage just after earthquake

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Rapid grasp of damages is very important for emergent countermeasures of large disaster in government level. However, outline of damage is not easy to grasp immediately after the big earthquake. For example, the outline became clear by live TV picture in case of the Southern Hyogo prefecture earthquake in 1995; it was 2 hours after the shock. The whole aspect of damage of Yamakoshi village became clear in the next morning in case of the Mid Niigata Prefecture Earthquake in 2004.

Lack of information is probable even now by darkness, bad weather, complication of information, and damage on communication line. In this case, rough forecast of damage based on seismic intensity and regional characteristics must be serviceable just after earthquake.

Early Estimation System (EES) of Disaster Information Systems (DIS), which cabinet office operates, quantitatively forecasts buildings and human damages. This study targets on geo-disasters, which EES do not target; slope collapse, landslide (as narrow sense), and soil liquefaction. We try to automatically calculate and send rough forecast information to related authorities within 30 minutes. The calculation uses real time information such as estimated seismic intensity distribution map by Japan Meteorological Agency, and existing geospatial information such as Digital Terrain Mode (DTM), geomorphologic data, geological data. The system also automatically output some overlay maps of real time information and existing geospatial information. The system provides environment to exchange ideas between assembled and non-assembled staff referring the rough forecasts and the overlay maps.

Automatic calculation of rough forecast is workable triggered by the real time information at the time of writing this manuscript. But it the calculation results are not in practical-use level. Other functions of the system are in developing. Calculations are in 1 km grid, and now improving to 250 m grid.

Rough forecast of slope collapse is based on the Rokko formula, which is developed by National Institute for Land and Infrastructure Management. The Rokko formula is depending on maximum acceleration, slope, and curvature. Maximum acceleration is estimated using seismic intensity. The Rokko formula is separated into acceleration part and slope/curvature part. Therefore slope/curvature part is calculated and histogram of the part within each cell is obtained before earthquake using 10 m grid DEM; its decrease amount of calculation at earthquake.

Rough forecast of land slide is calculated by table operation of seismic intensity and land slide area ratio, which is ratio of transportation and sediment area over the whole area of the grid cell.

Rough forecast of soil liquefaction is calculated by table operation of seismic intensity and geomorphologic data. We use Wkamatsu's geomorphologic data, because the data was produced by same method over whole Japan.

Keywords: realtime damage forecast, earthquake