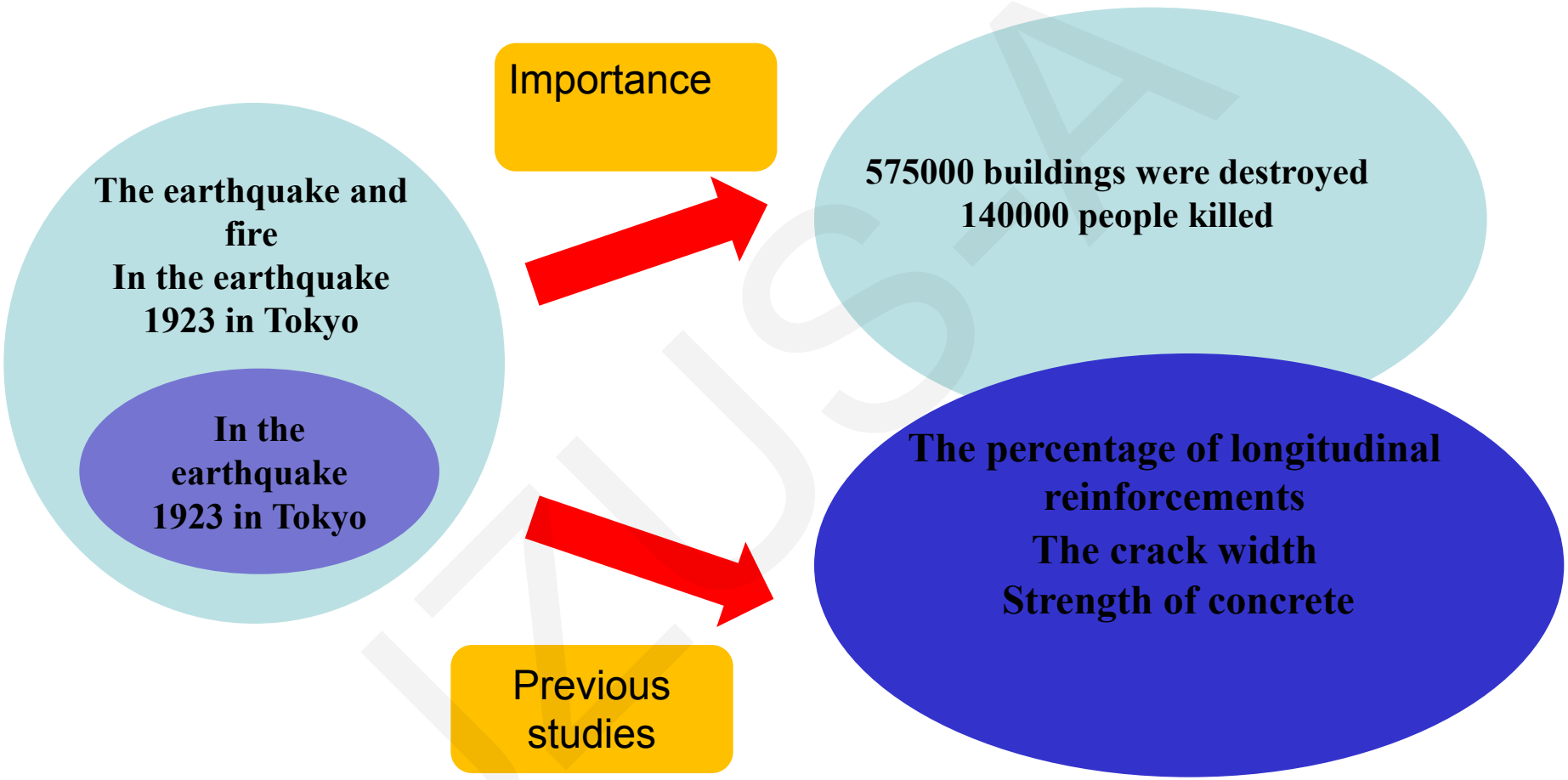
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Prediction of the load-carrying capacity of reinforced concrete connections under post-earthquake fire

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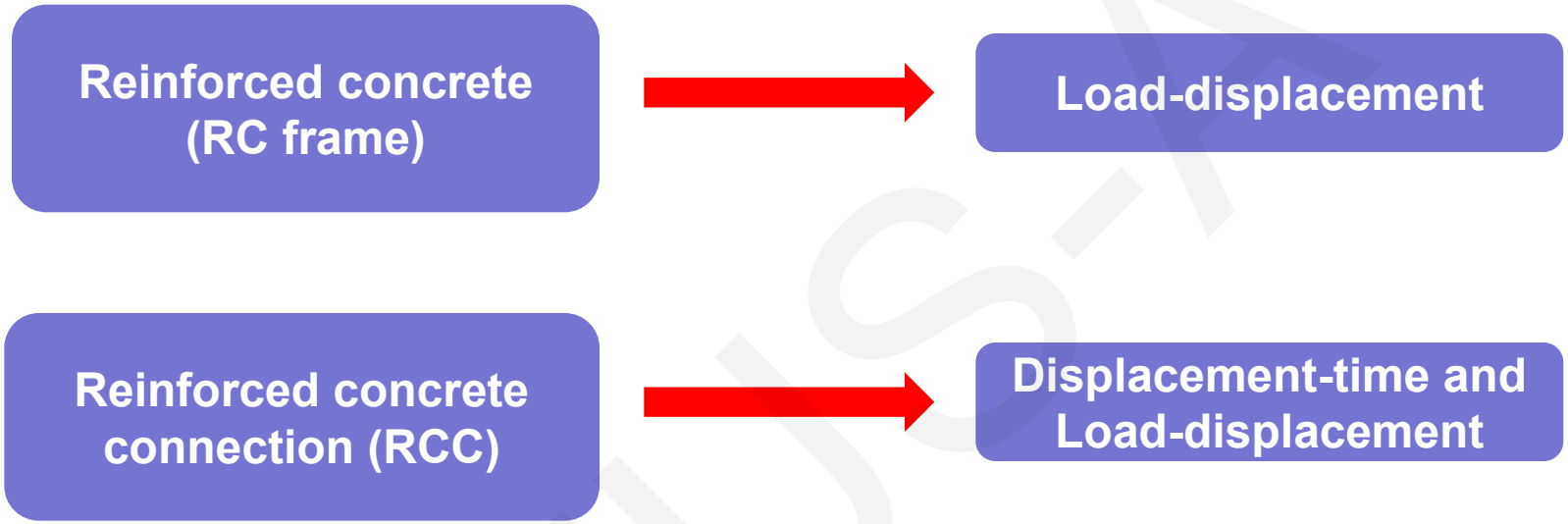
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Fire after an earthquake



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Verification with two studies



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The developed Finite element model

■132 FE models were developed wit various variables

Variables

(a) Beam depth
(b) The ratio of the compressive force to the compressive strength of the column
(c) Compressive strength of concrete
(d) The ratio of longitudinal bars of the column
(e) The ratio of longitudinal bars of the beam
(f) The ratio of longitudinal bars of connection; (g) the ratio of beam depth to column depth
(g) The bonded index of column bars
(h) The applied temperature.

Output

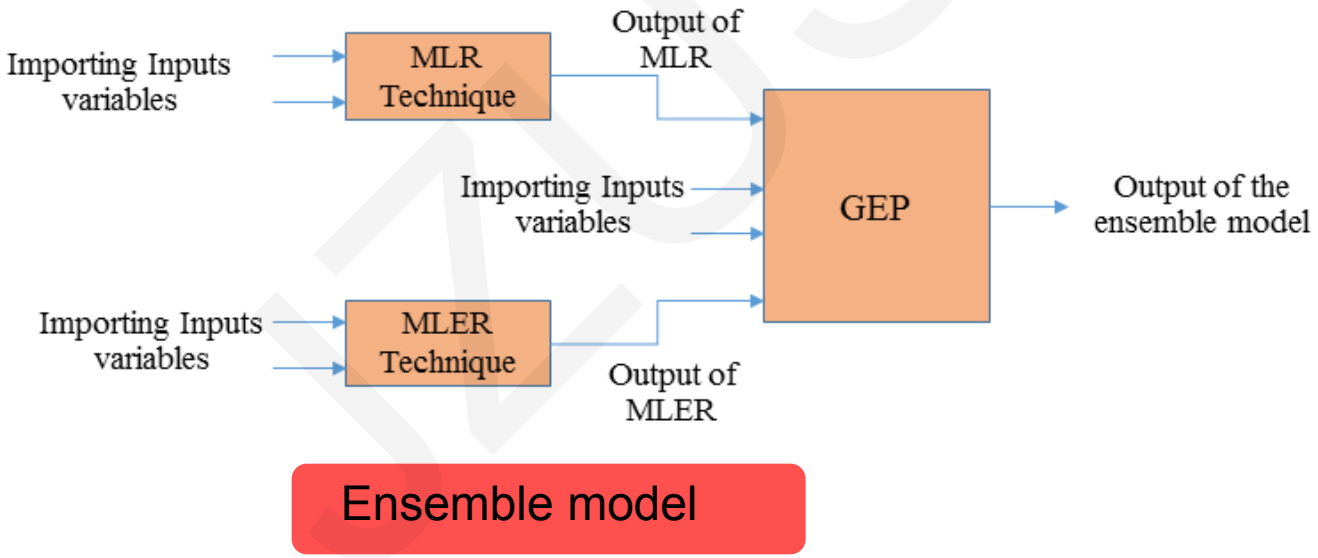
(a) The load carrying capacity
(b) Damage

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Prediction models

- **Models:**

-Multi linear regression (MLR)
-Multi Ln equation regression (MLnER)
-Gene expression programming (GEP)
-Ensemble model



Conclusions

- Increasing the temperature from 25 ° C to 600 and 1000 ° C caused more than a 25% and 75% reduction, respectively, in the load-carrying capacity of the RCC.
- The most effective parameter for improving the fire resistance of the RCC was the RLC. Increasing the longitudinal reinforcement bars of a column (RLC) from 1 to 8% increased the load-carrying capacity of the RCC at different temperatures by 234.8-492.9%.
- Increasing the compressive strength of concrete increased the remaining load-carrying capacity of the RCC under post earthquake fire (PEF) slightly. This effect was more significant at higher temperatures, at which the mechanical properties of steel decrease rapidly.
- The ensemble model was selected as the best model for predicting the remaining load-carrying capacity of the RCC under PEF.

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