

Merging Models Across Coalition Edge Devices using Generative Policy



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Demo Scenario

- We will show how models created by different partners can be shared across coalition partners to create a combined merged model.
 - US, UK, France and Kish have trained models to classify sounds.
 - US models are excellent at detecting explosion sounds (e.g. gunfire, bombs), but the coalition partners have models that are good at detecting other sounds (e.g. land and air traffic, tanks, jeeps, planes, etc.)
 - US would like to merge their model with coalition partners so they can improve accuracy and detect a wider range of sounds
- Generative policies will be used:
 - Relax or restrict access to the models based on changing contextual conditions or performance of models
 - Control parameters needed for model fusion

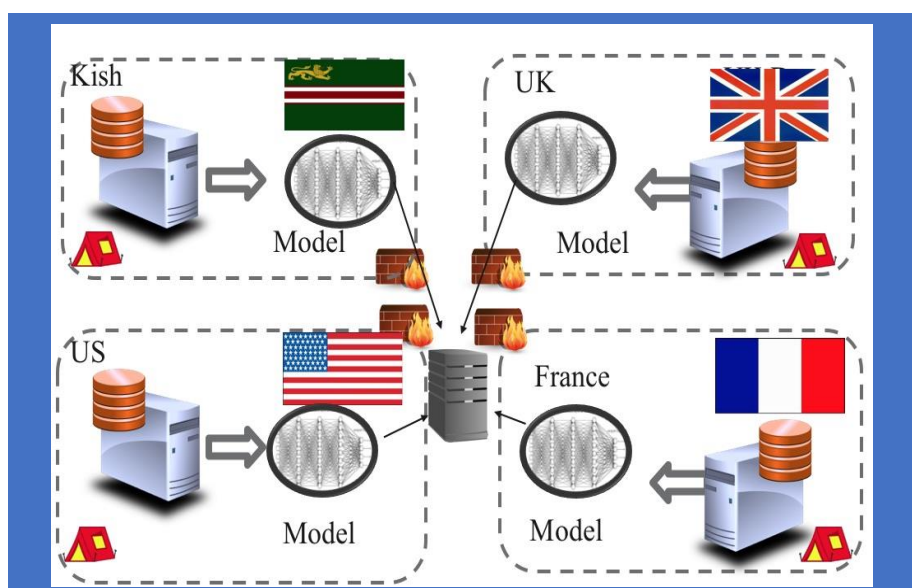


Figure 1: Model Sharing in a Coalition

Generative Policies

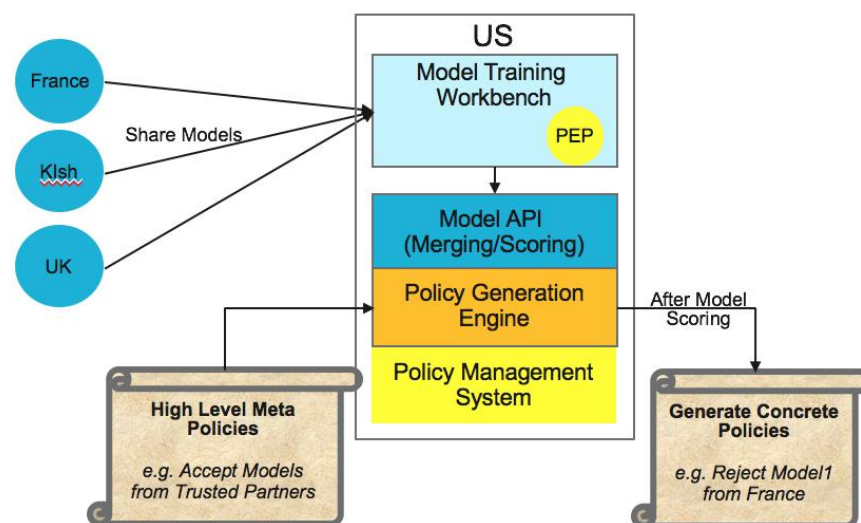


Figure 2. Policy Generation

After models are shared, they are evaluated against the US test data set. Based on the performance of the evaluation, new policies are automatically generated.

Model Merging

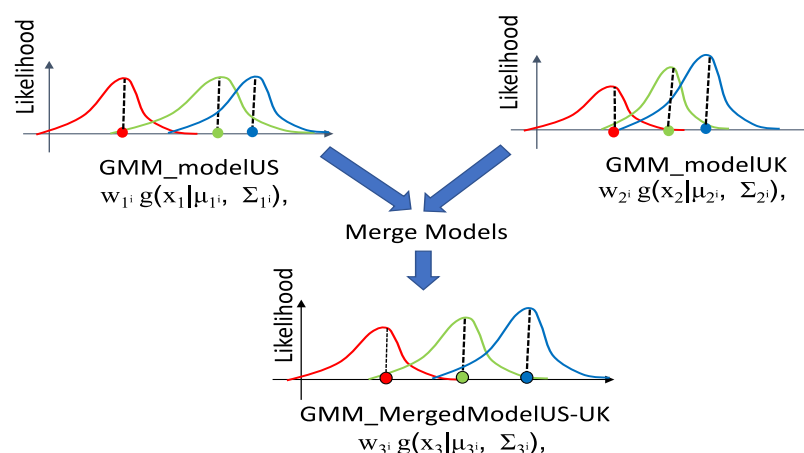


Figure 3. Merging GMM models

- Leverage information from partners' trained models to create a merge model that improves performance of coalition's model.
- Avoids sharing partner's sounds datasets used during model training.

References

- ¹D. Verma, S. Chakraborty, S. Calo, S. Julier, S. Pasteris, "An algorithm for model fusion for distributed learning"
- ²D. Verma, E. Bertino, S. Calo, C. Williams, C. Simpkin., "A generative policy approach for collaboration in coalition environments"

Both papers presented at SPIE Defense + Security conference May 2018