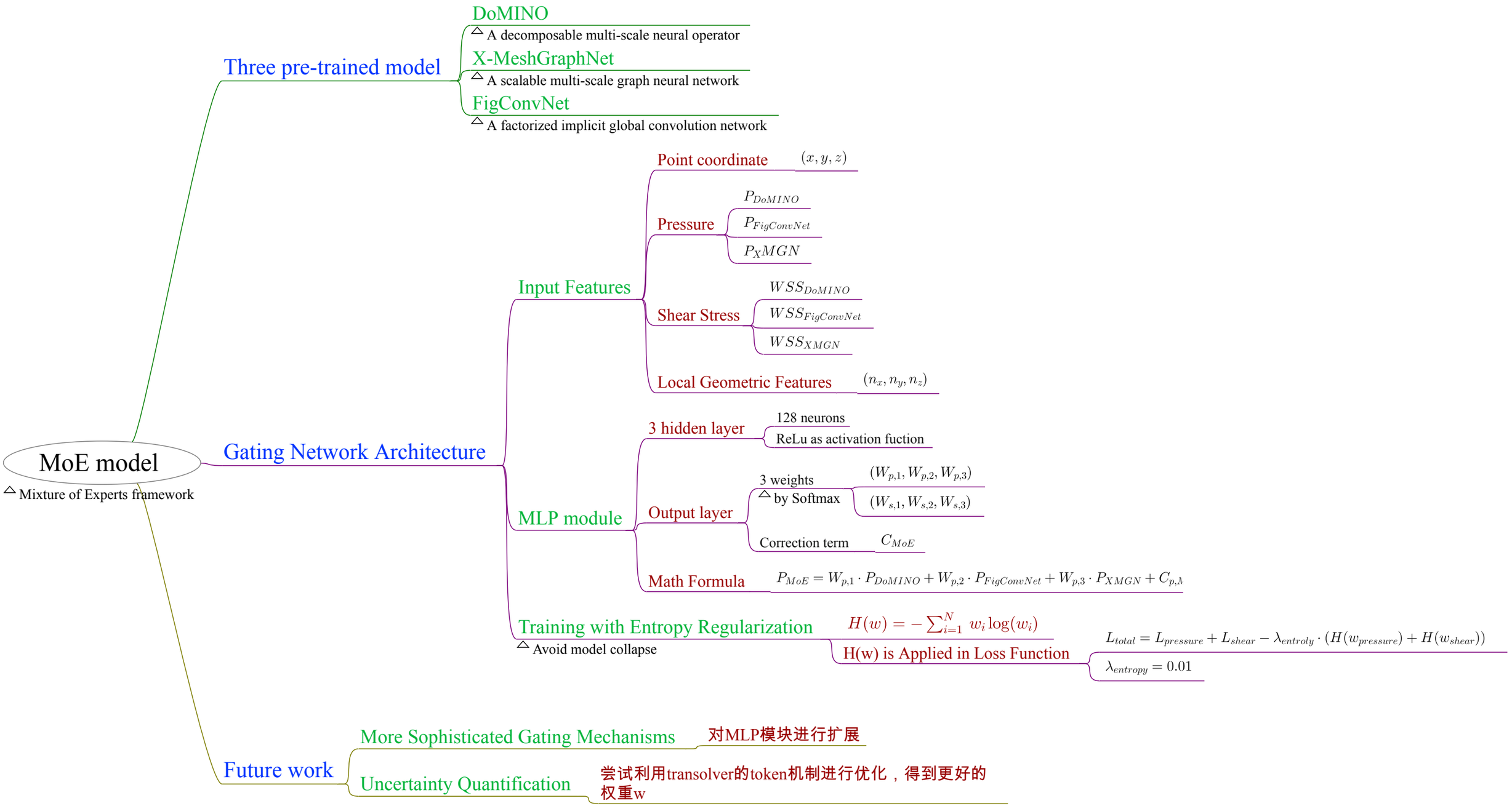
MoE model
Mixture of Experts framework
Three pre-trained model
DoMINO
A decomposable multi-scale neural operator
X-MeshGraphNet
A scalable multi-scale graph neural network
FigConvNet
A factorized implicit global convolution network
Gating Network Architecture
Input Features
Point coordinate
(x, y, z)
Pressure
P_{DoMINO}
$P_{FigConvNet}$
P_{XMGN}
Shear Stress
WSS_{DoMINO}
$WSS_{FigConvNet}$
WSS_{XMGN}
Local Geometric Features
(n_x, n_y, n_z)
MLP module
3 hidden layer
128 neurons
ReLu as activation fuction
Output layer
3 weights
by Softmax
$(W_{p,1}, W_{p,2}, W_{p,3})$
$(W_{s,1}, W_{s,2}, W_{s,3})$
Correction term
C_{MoE}
Math Formula
$P_{MoE} = W_{p,1} \cdot P_{DoMINO} + W_{p,2} \cdot P_{FigConvNet} + W_{p,3} \cdot P_{XMGN} + C_{p,M}$
Training with Entropy Regularization
Avoid model collapse
$H(w) = -\sum_{i=1}^{N} w_i \log(w_i)$
H(w) is Applied in Loss Function
$L_{total} = L_{pressure} + L_{shear} - \lambda_{entroly} \cdot (H(w_{pressure}) + H(w_{shear}))$
$\lambda_{entropy} = 0.01$
Future work
More Sophisticated Gating Mechanisms
对MLP模块进行扩展
Uncertainty Quantification
尝试利用transolver的token机制进行优化，得到更好的权重w