Experiment Mgr Example with Custom Training Loop and UI based on the 3D Brain Segmentation Example

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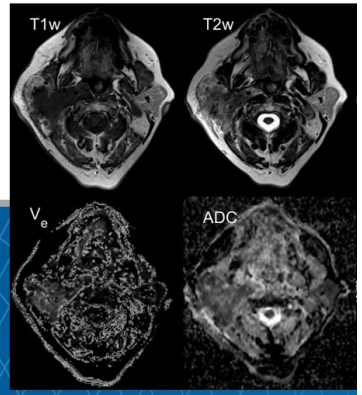
Motivation from Univ of Freiburg Med Res Ctr Project using Multiple MRI Channels

Original solution driven by special needs of customer

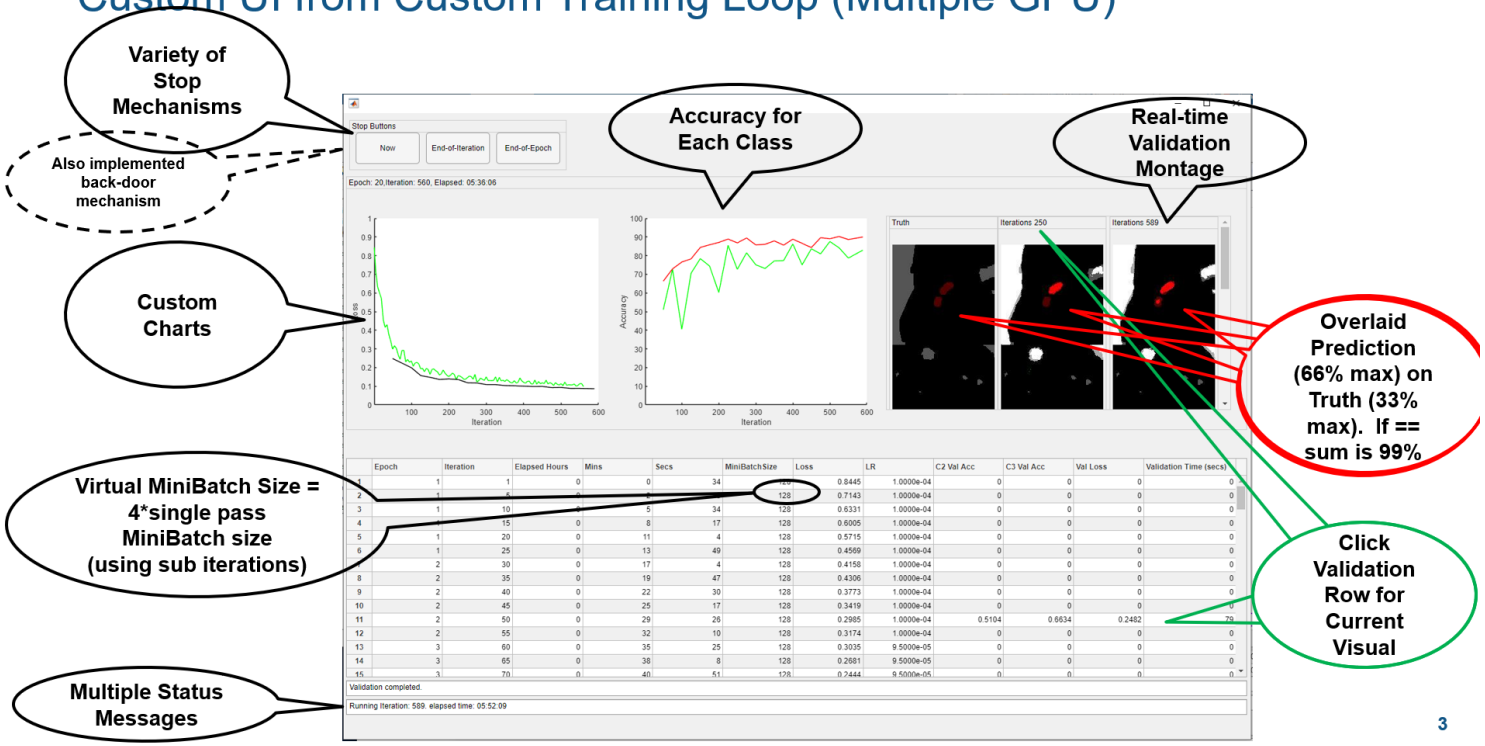
Resolving trainNetwork() Limitations Custom Training, Custom UI and Virtual MiniBatch (for UofFreiburg Throat Cance

[1]

By Arnie Berlin
June 4th, 2020

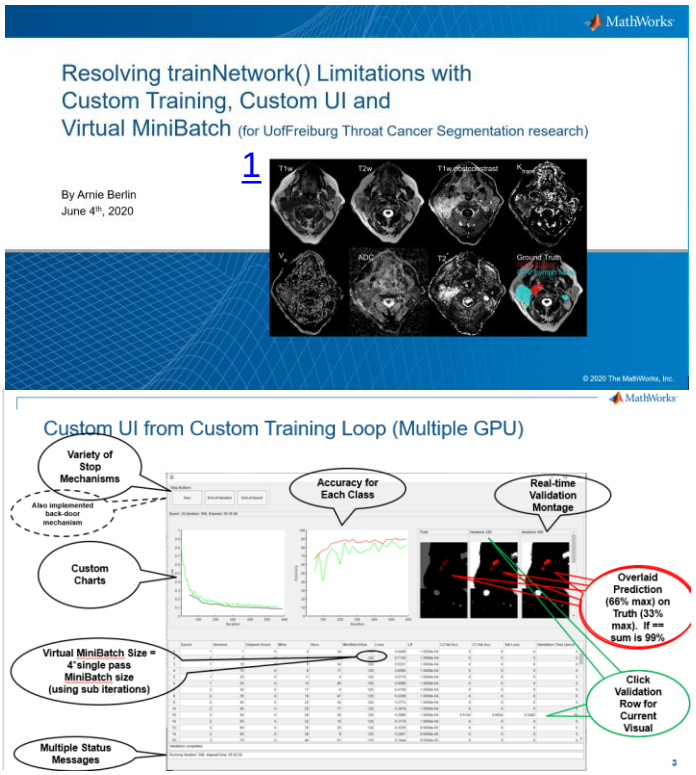


Custom UI from Custom Training Loop (Multiple GPU)

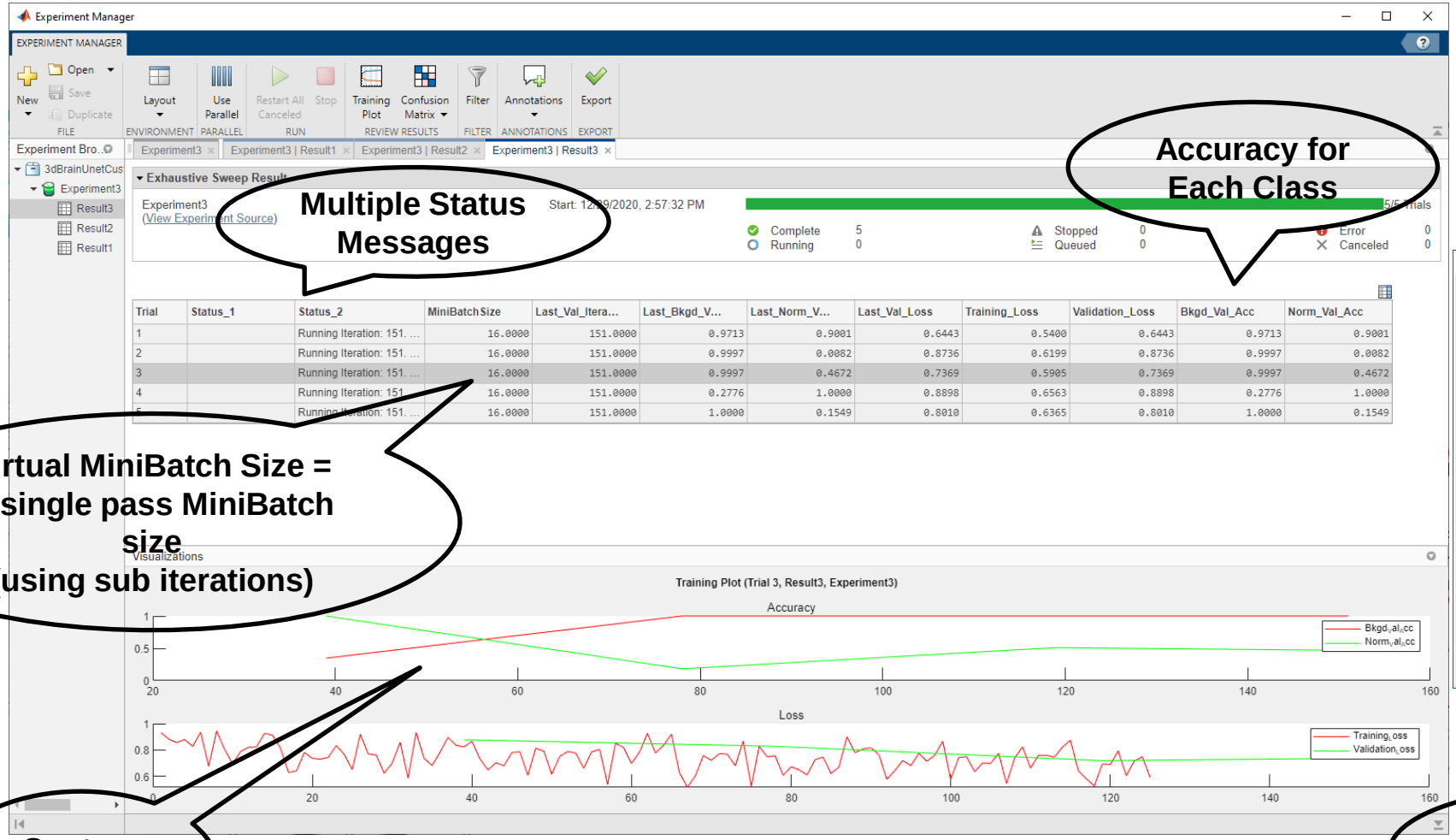


Motivation from Univ of Freiburg Med Res Ctr Project using Multiple MRI Channels

Original solution driven by special needs of customer → **Ported to 3D Brain example**



Custom Features Implemented using Experiment Manager



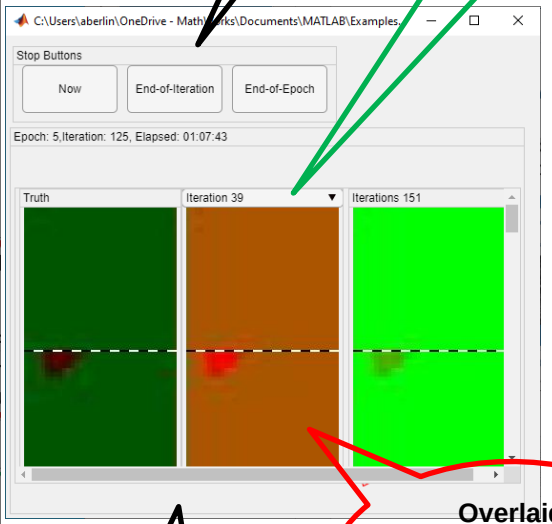
Multiple Status Messages

Accuracy for Each Class

Variety of Stop Mechanisms

Select Validation Row for Current Visual

Secondary UI



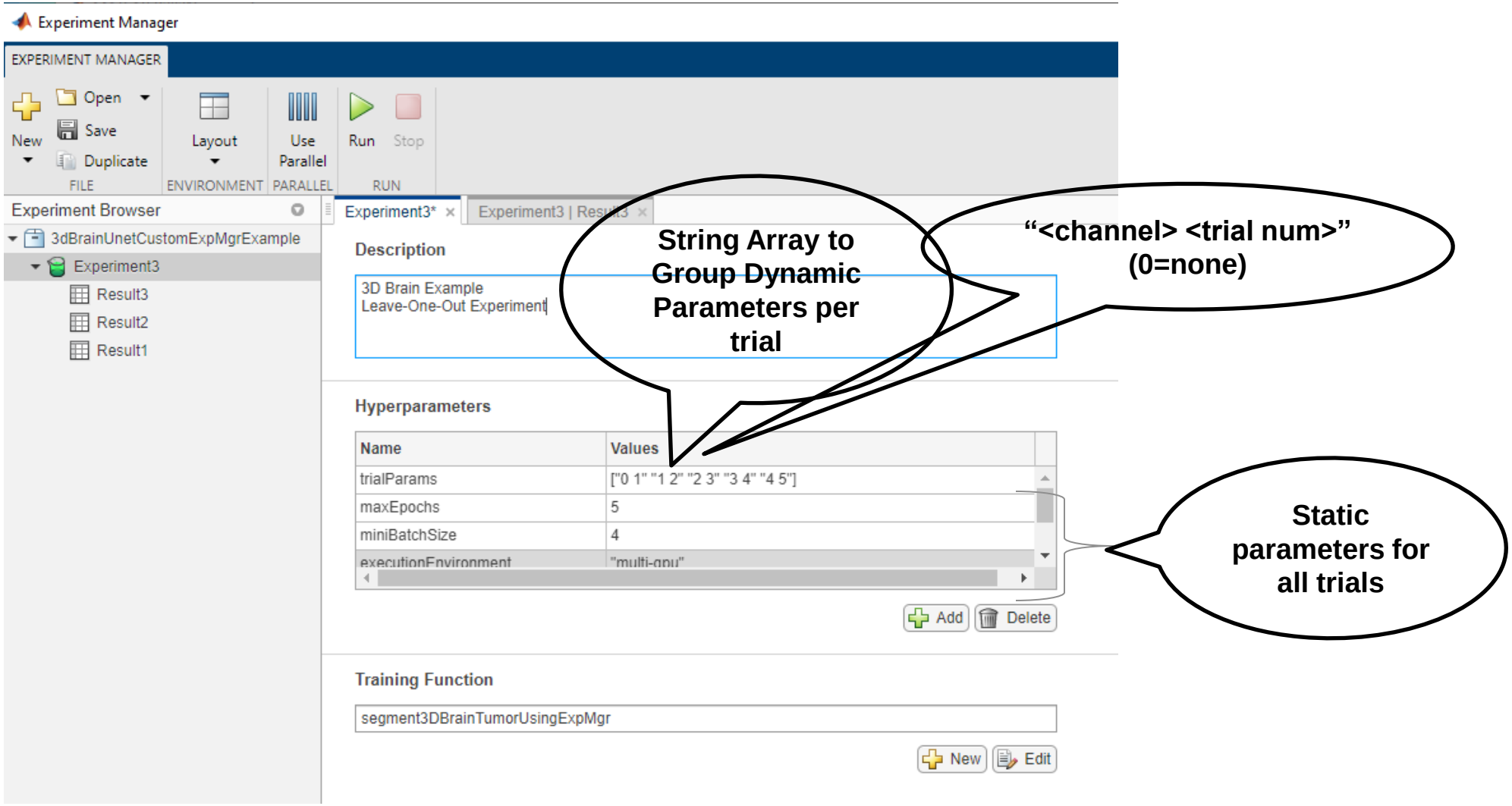
Virtual MiniBatch Size = 4*single pass MiniBatch size (using sub iterations)

Custom Charts

Real-time Validation Montage

Overlaid Prediction (66% max) on Truth (33% max). Sum is 99% if equal

Experiment Setup Panel



Basic Constructs

```
111
112         %have to wait until g_expMonitor is assigned in trainDLNetwork()
113 -       if ~isempty(g_expMonitor)
114 -           if isempty(g_expMonitor.Info)
115 -               g_expMonitor.Info = ["Status_1","Status_2","Iteration","Epoch","MiniBatchSize","LearnRate","Last_Val_Iterat
116 -               g_expMonitor.Metrics = ["Training_Loss","Validation_Loss","Bkgd_Val_Acc","Norm_Val_Acc"];
117 -               groupSubPlot(g_expMonitor,"Loss",["Training_Loss","Validation_Loss"]);
118 -               groupSubPlot(g_expMonitor,"Accuracy",["Bkgd_Val_Acc","Norm_Val_Acc"]);
119 -           end
120 -           if g_expMonitor.Stop
121 -               send(g_clientStopTrainingSignal,[{true} {false} {false}]);
122 -           end
123 -       end
```

```
301 -           addpoints(lineValNormAccurCell{1},iteration,double(100*valA
302 -           drawnow;
303 -           updateInfo(g_expMonitor,"Last_Val_Iteration",iteration,...
304                 "Last_Bkgd_Val_Acc",valAccur(1), ...
305                 "Last_Norm_Val_Acc",valAccur(2), ...
306                 "Last_Val_Loss",valLoss);
307 -           recordMetrics(g_expMonitor,iteration,...
308                 "Bkgd_Val_Acc",valAccur(1), ...
309                 "Norm_Val_Acc",valAccur(2), ...
310                 "Validation_Loss",valLoss);
311 -           lastValAccur = valAccur;
312 -           lastValLoss = valLoss;
313 -       end
```

Footnotes

- 1) Bielak, L., Wiedenmann, N., Berlin, A. et al. Convolutional neural networks for head and neck tumor segmentation on 7-channel multiparametric MRI: a leave-one-out analysis. Radiat Oncol 15, 181 (2020). https://doi.org/10.1186/s13014-020-01618-z