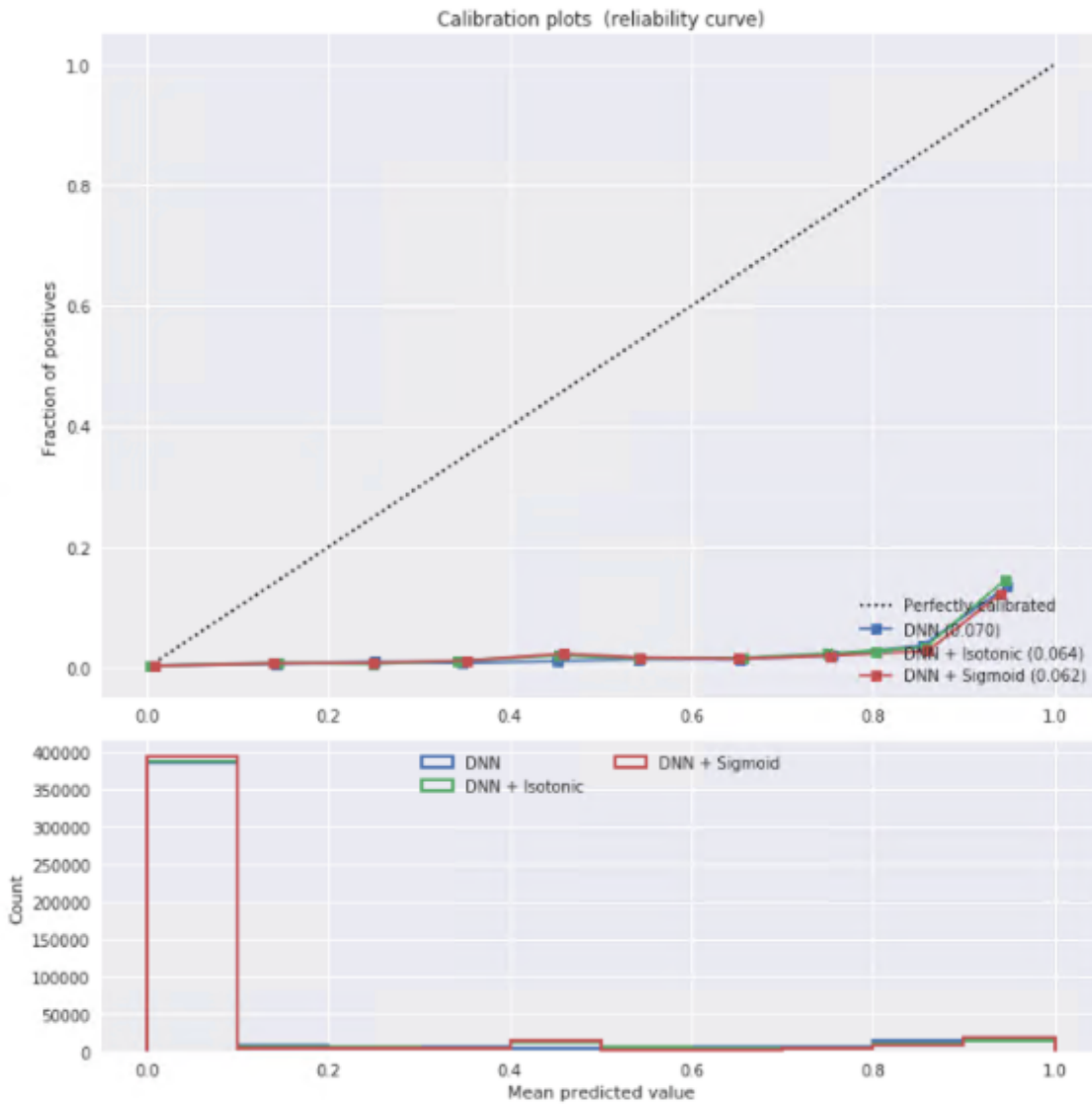


Supplemental Figure 1. Calibration curve for optimal model with results from re-scaling methods



Legend: Calibration plot for the DNN with alternative curves demonstrating lack of improvement in calibration with use of rescaling methods (both Platt's rescaling and isotonic regression).

Python Code:

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Conversion of the second argument of issubdtype from `float` to `np.floating` is deprecated. In
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    "import numpy as np\n",
    "import google.datalab.bigquery as bq\n",
```

```

"import pandas as pd\n",
"import tensorflow as tf\n",
"from tensorflow.contrib import lookup\n",
"from tensorflow.python.platform import gfile\n",
"import numpy\n",
"import keras as kr\n",
"from keras.preprocessing.text import Tokenizer\n",
"from keras.models import Sequential\n",
"from keras.layers import Dense, Activation, Dropout\n",
"from keras.layers.advanced_activations import LeakyReLU, PReLU\n",
"import itertools\n",
"from sklearn.metrics import confusion_matrix\n",
"import matplotlib.pyplot as plt\n",
"import datetime\n",
"import time"
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"                        cmap=plt.cm.Blues):\n",
"    \"\n",
"    This function prints and plots the confusion matrix.\n",
"    Normalization can be applied by setting `normalize=True`.\n",
"    \"\n",
"    plt.imshow(cm, interpolation='nearest', cmap=cmap)\n",
"    plt.title(title)\n",
"    plt.colorbar()\n",
"    tick_marks = np.arange(len(classes))\n",
"    plt.xticks(tick_marks, classes, rotation=0)\n",
"    plt.yticks(tick_marks, classes)\n",
"\n",
"    if normalize:\n",
"        cm = cm.astype('float') / cm.sum(axis=1)[:, np.newaxis]\n",
"        #print("Normalized confusion matrix")\n",
"    else:\n",
"        #print('Confusion matrix, without normalization')\n",
"\n",

```

```

" #print(cm)\n",
"\n",
" thresh = cm.max() / 2.\n",
" for i, j in itertools.product(range(cm.shape[0]), range(cm.shape[1])):\n",
"     plt.text(j, i, cm[i, j],\n",
"             horizontalalignment=\"center\",\n",
"             color=\"white\" if cm[i, j] > thresh else \"black\")\n",
"\n",
" plt.tight_layout()\n",
" plt.ylabel('True label')\n",
" plt.xlabel('Predicted label')"
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```

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"from sklearn import preprocessing\n",
"encoder = preprocessing.LabelBinarizer()\n",
"encoder.fit(train_label)\n",
"y_train = encoder.transform(train_label)\n",
"y_test = encoder.transform(test_label)\n",
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"from imblearn.over_sampling import SMOTE\n",
"from imblearn.combine import SMOTEENN\n",
"from imblearn.combine import SMOTETomek\n",
"from imblearn.over_sampling import RandomOverSampler\n",
"from imblearn.over_sampling import ADASYN\n",
"from sklearn import preprocessing\n",
"from imblearn.under_sampling import ClusterCentroids\n",
"from imblearn.under_sampling import RandomUnderSampler\n",
"\n",
"\n",
"print(\"Before OverSampling, counts of label '1': {}".format(sum(y_train==1)))\n",
"print(\"Before OverSampling, counts of label '0': {} \\n\".format(sum(y_train==0)))\n",
"\n",
"sm = RandomUnderSampler(random_state=42)\n",
"X_train_res, y_train_res = sm.fit_sample(x_train, y_train)\n",
"\n",
"t0 = time.time()\n",
"\n",
"\n",

```

```

"from xgboost import XGBClassifier\n",
"import time\n",
"t0 = time.time()\n",
"gbm = XGBClassifier(max_depth=4, n_estimators=20000, learning_rate=0.05,
nthread=60).fit(X_train_res, y_train_res.ravel())\n",
"y_pre = gbm.predict(x_test)\n",
"\n",
"t1 = time.time()\n",
"total = t1-t0\n",
"\n",
"cnf_matrix = confusion_matrix(y_test, y_pre)\n",
"from sklearn.metrics import f1_score\n",
"print(\f-score metric in the testing dataset: {}%\n".format(f1_score(y_test, y_pre,
average='binary') ))\n",
"from sklearn import metrics\n",
"fpr, tpr, thresholds = metrics.roc_curve(y_test, y_pre)\n",
"print(\AUC of test dataset is: {}%\n".format(metrics.auc(fpr, tpr)))\n",
"class_names = [0,1]\n",
"plt.figure()\n",
"plot_confusion_matrix(cnf_matrix, classes=class_names, title='Confusion matrix')\n",
"plt.show()\n",
"print(datetime.datetime.now())\n",
"print(\total time all features xgboost and RandomOverSampler:{}%\n".format(total))\n",
"\n",
"fpr, tpr, threshold = metrics.roc_curve(y_test, y_pre)\n",
"roc_auc = metrics.auc(fpr, tpr)\n",
"\n",
"# method I: plt\n",
"import matplotlib.pyplot as plt\n",
"plt.title('Receiver Operating Characteristic')\n",
"plt.plot(fpr, tpr, 'b', label = 'AUC = %0.2f' % roc_auc)\n",
"plt.legend(loc = 'lower right')\n",
"plt.plot([0, 1], [0, 1], 'r--')\n",
"plt.xlim([0, 1])\n",
"plt.ylim([0, 1])\n",
"plt.ylabel('True Positive Rate')\n",
"plt.xlabel('False Positive Rate')\n",
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