



Capstone Project

Yelp photo classification

Mi Yan



Find tacos, cheap dinner, Max's

Near Austin, TX, US



Sign Up



Restaurants



Delivery



Reservations

Write a Review

Events

Talk

Log In

Food photos for Uchiko



Uchiko



1354 reviews

Add photos

All (1887)

Food (1510)

Inside (41)

Drink (40)

Menu (23)

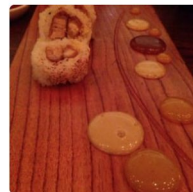
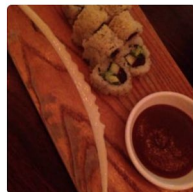
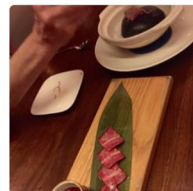
Outside (10)

All Food (1510)

Sushi (373)

Dessert (126)

Salads (39)





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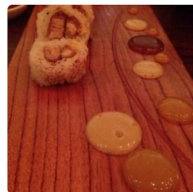
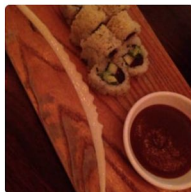
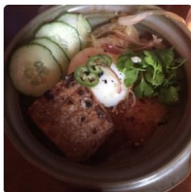
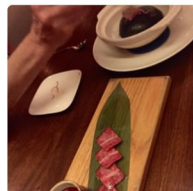
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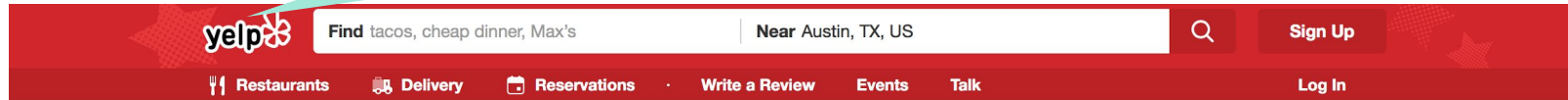
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Salads (39)



On an **evenly** split test set,, overall **precision of 94%**, and **recall of 70%**. While these numbers **can definitely be improved**,



Food photos for Uchiko



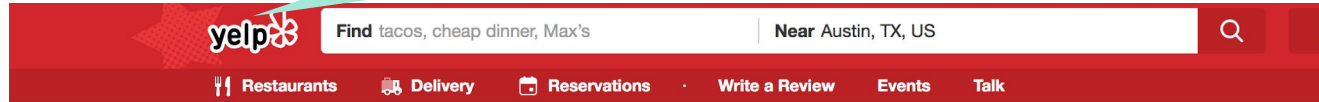
 Add photos

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All Food (1510) [Sushi \(373\)](#) [Dessert \(126\)](#) [Salads \(39\)](#)



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Food photos for Uchiko



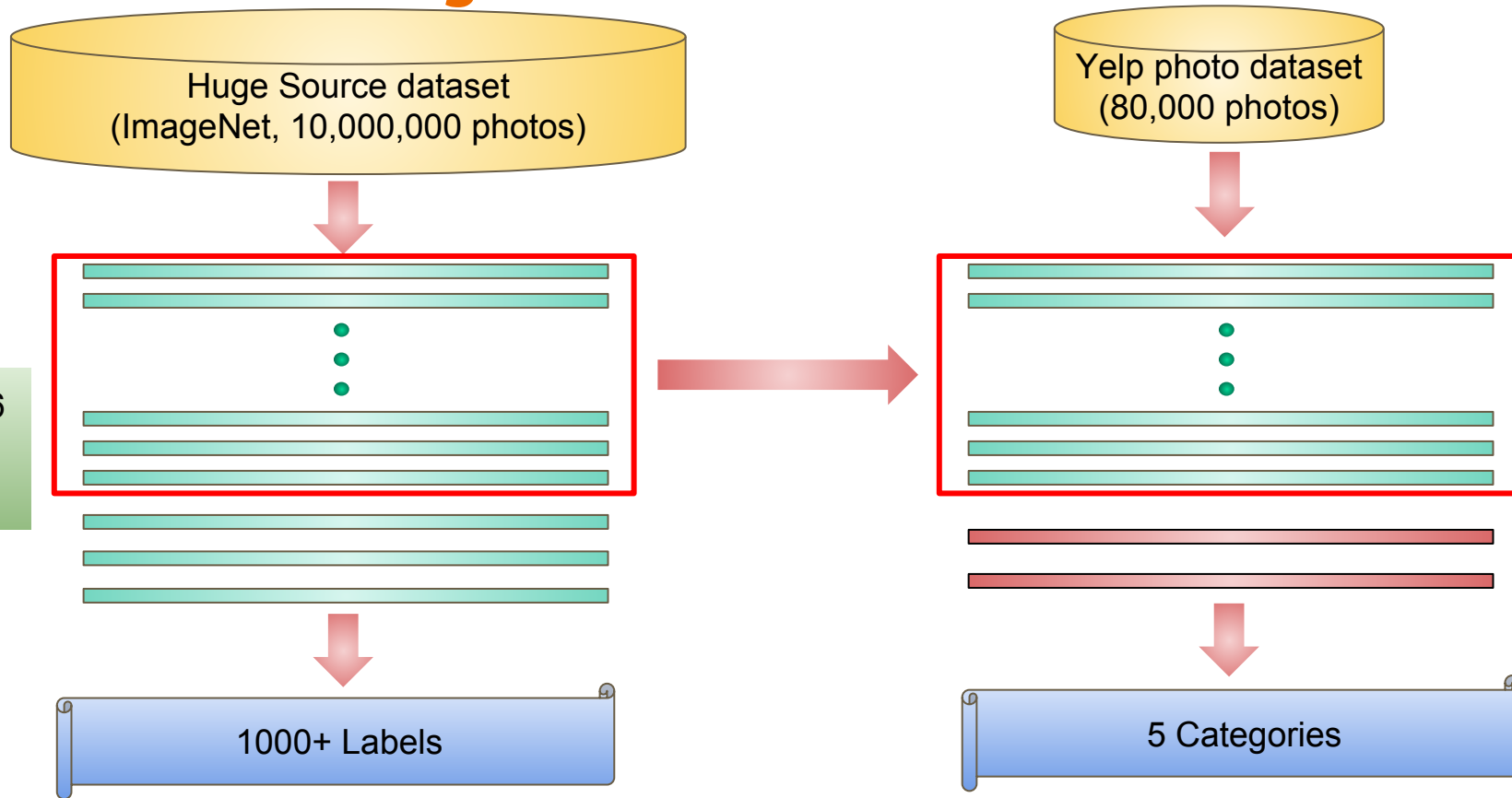
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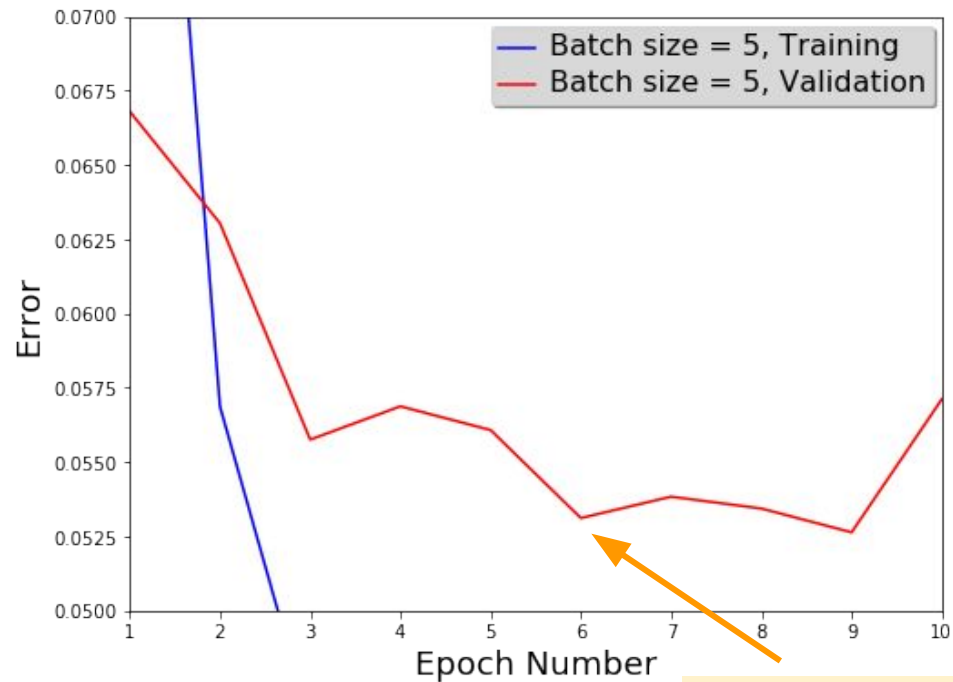


Transfer Learning



* Convolutional Neural Network

Train / Validation error curves



Optimal epoch = 6

Dataset Split

Test

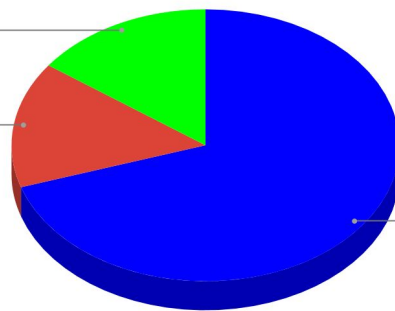
15.0%

Validation

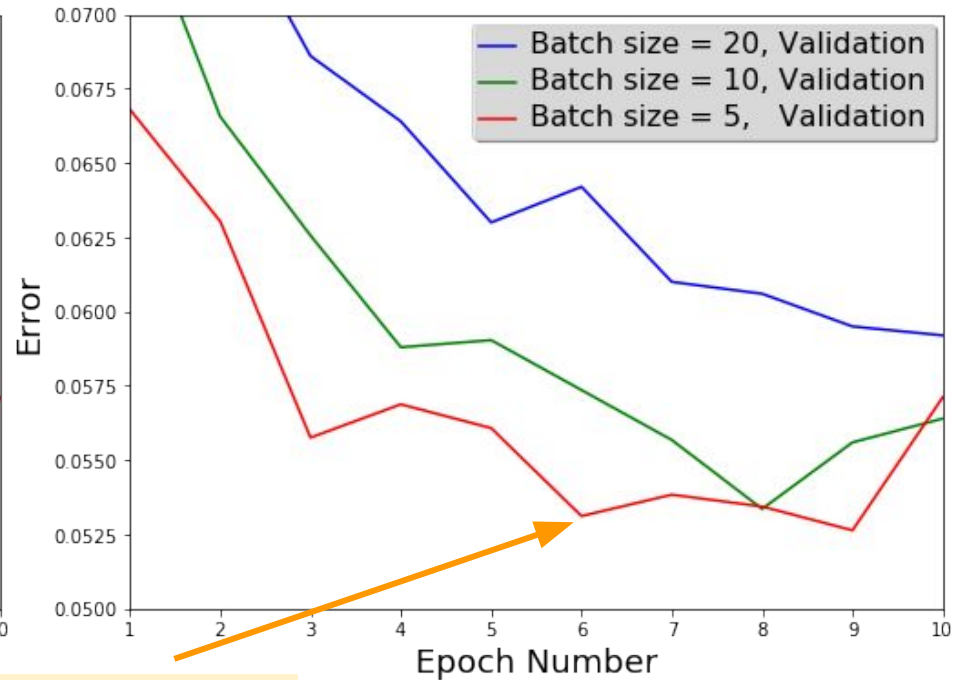
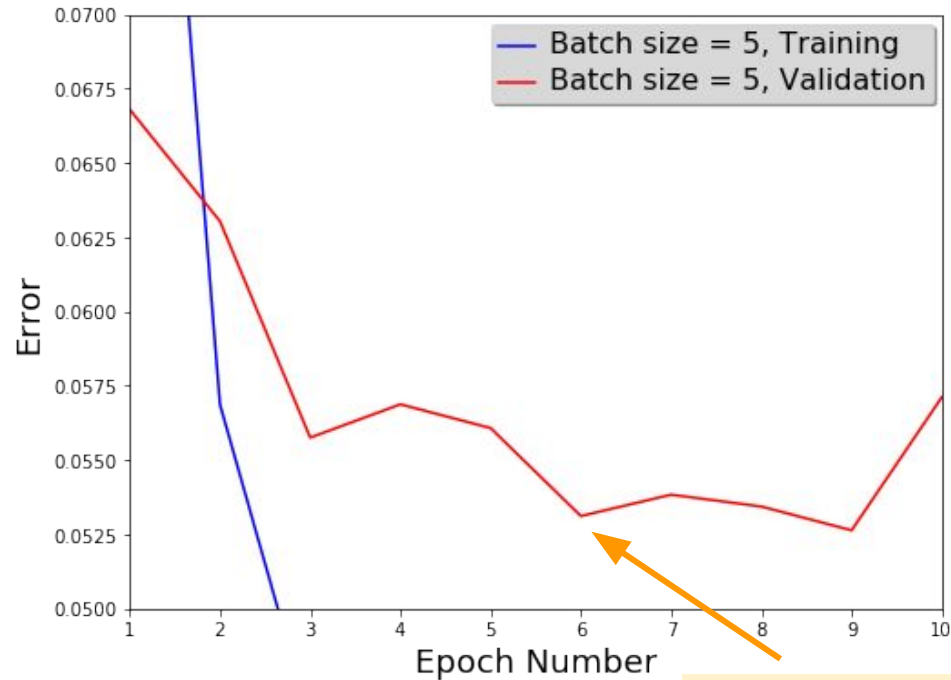
15.0%

Training

70.0%



Train / Validation error curves

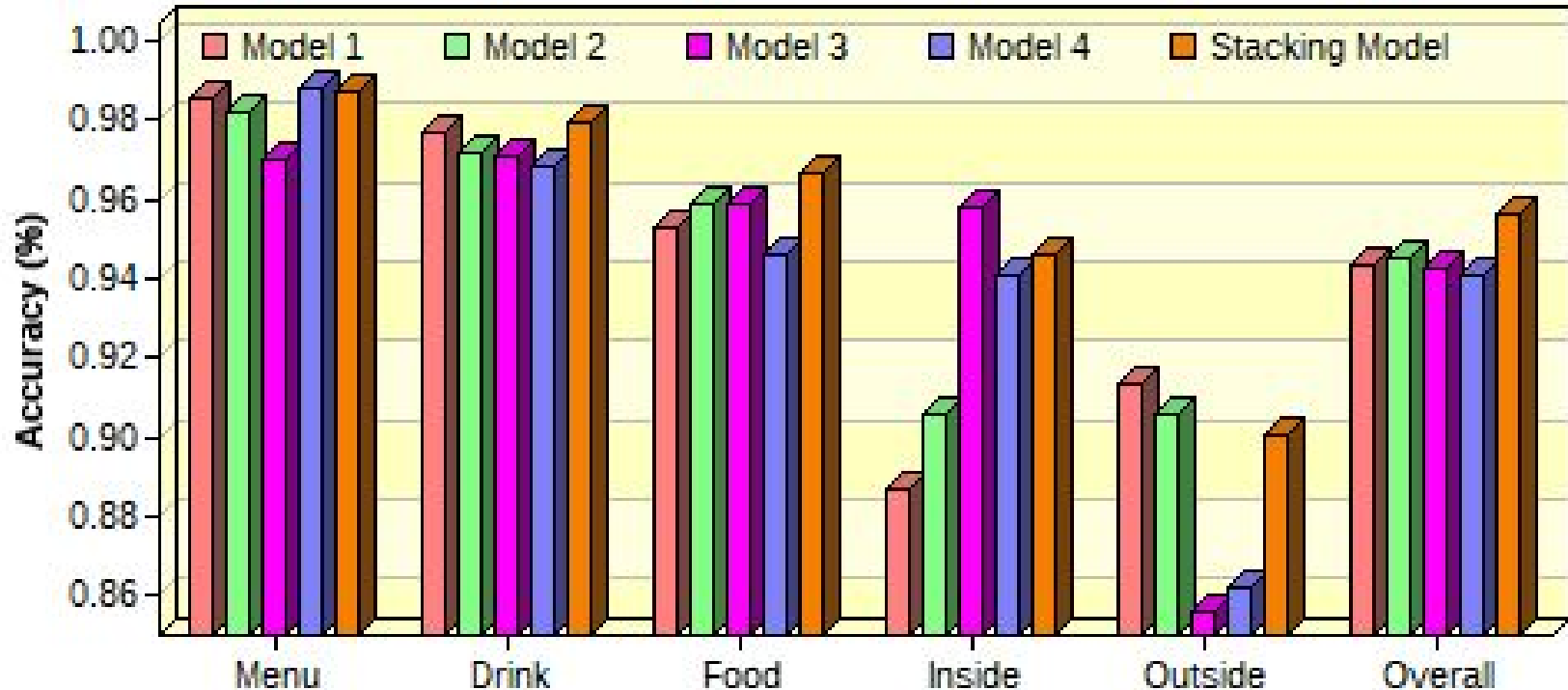


Optimal epoch = 6
Optimal batch size = 5

Stacking Model for Validation data

Stacking Model = $0.27 * \text{Model1} + 0.14 * \text{Model2} + 0.36 * \text{Model3} + 0.23 * \text{Model4}$

Accuracy of each model and stacking model



Predicted Probability

Menu



Drink



Food



Inside



Outside



Menu	0.9999	9.953e-08	0.0007	1.065e-06	0.0003
Drink	3.917e-08	0.9999	0.3094	1.376e-07	2.080e-05
Food	1.101e-08	3.971e-07	0.6866	3.950e-07	0.0012
Inside	2.541e-08	7.883e-09	0.0012	0.9988	0.0009
Outside	2.227e-06	4.644e-08	0.0020	0.0012	0.9976

Predicted Probability

Menu



Drink



Food



Inside

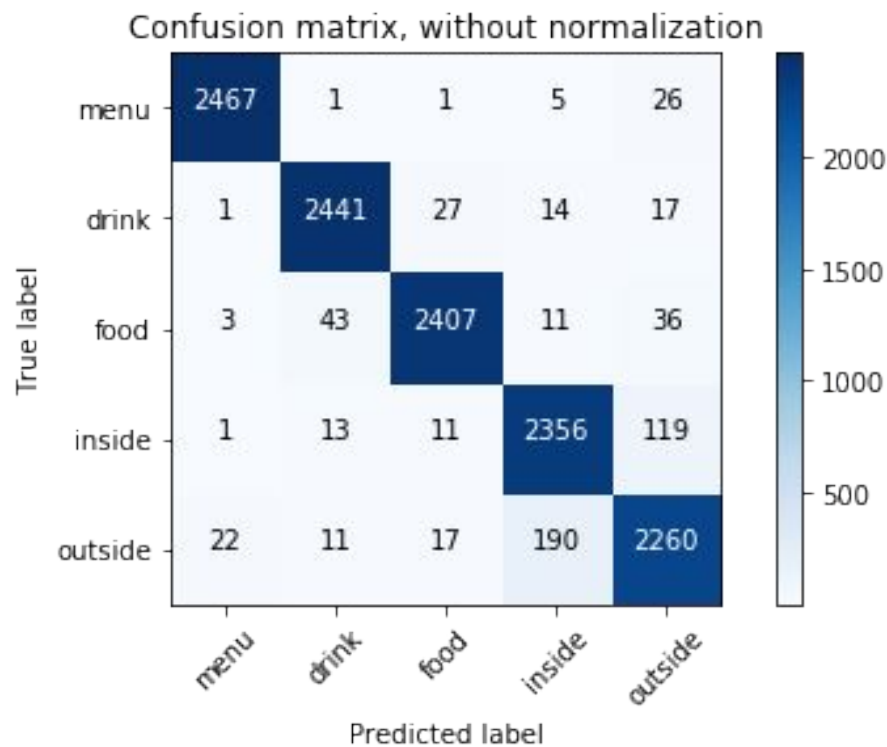


Outside

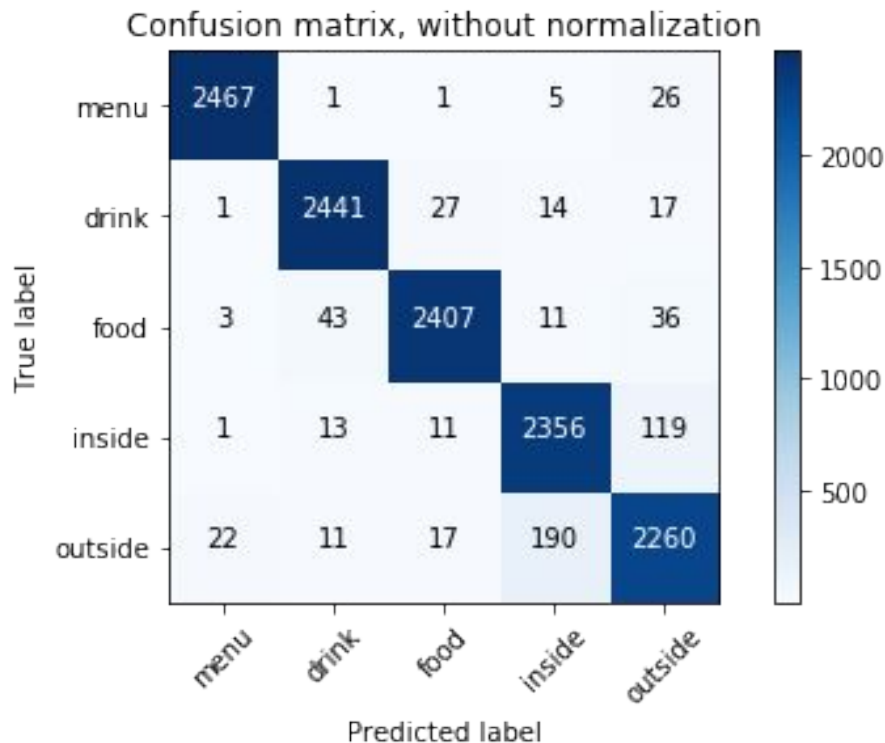


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Confusion Matrix for Test data



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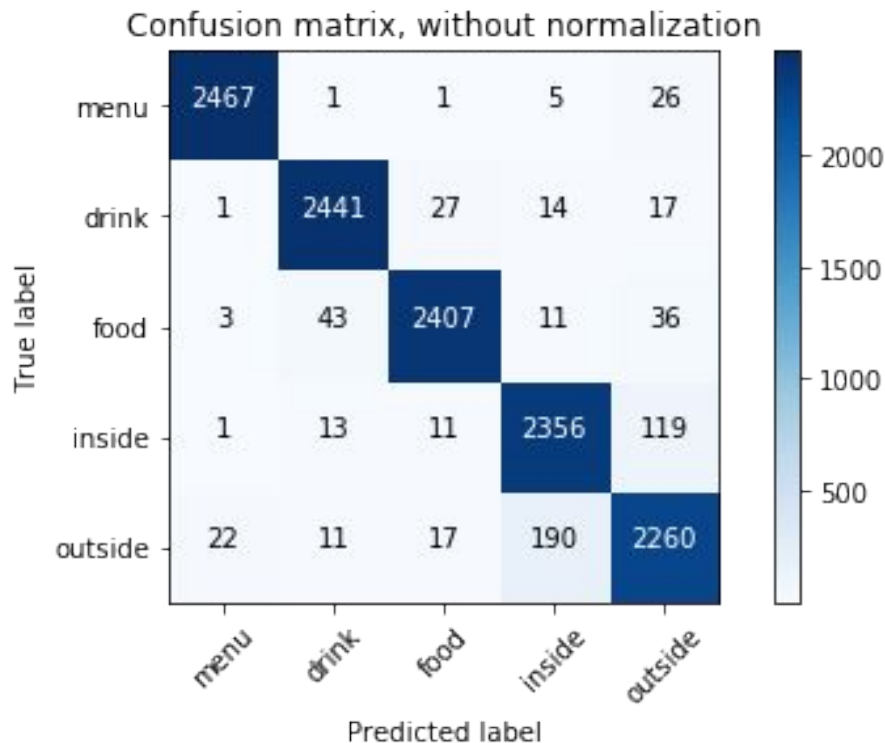


Accuracy = 95.39%

Precision = 95.47%

Recall = 95.39%

Confusion Matrix for Test data



Accuracy = 95.39%

Precision = 95.47% *vs* 94% (yelp)

Recall = 95.39% *vs* 70% (yelp)

Summary

- Build a photo classifier based on CNN transfer learning algorithm
- Improve the accuracy and recall
- Mis-label could be one reason limiting the further improvement
- Other base models or model stacking methods may help more