

# Food Price Tracker

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# Scientific Problem



# Our Solution



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# Data

kaggle

food\_train by madhuprasad

**ETH** zürich

Food 101  
Federal Institute of Technology Zurich (ETHZ)

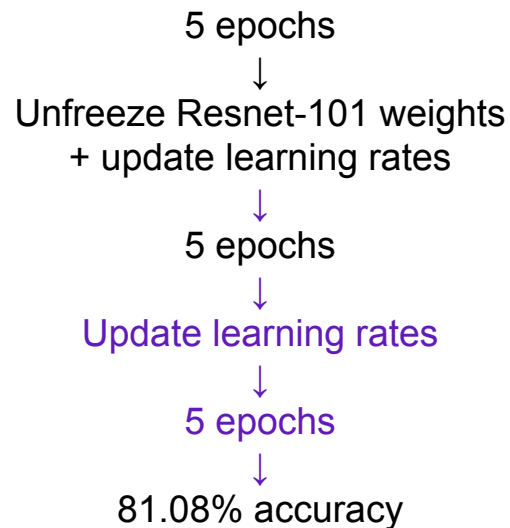
# Pre-Processing

```
tfms = ([RandTransform(tfm=TfmCrop (crop_pad), kwargs={'row_pct': (0, 1), 'col_pct': (0, 1), 'padding_mode': 'reflection'}, p=1.0, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmAffine (flip_affine), kwargs={}, p=0.5, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmCoord (symmetric_warp), kwargs={'magnitude': (-0.2, 0.2)}, p=0.75, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmAffine (rotate), kwargs={'degrees': (-10.0, 10.0)}, p=0.75, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmAffine (zoom), kwargs={'scale': (1.0, 1.1), 'row_pct': (0, 1), 'col_pct': (0, 1)}, p=0.75, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmLighting (brightness), kwargs={'change': (0.3, 0.7)}, p=0.75, resolved={}, do_run=True, is_random=True),
        RandTransform(tfm=TfmLighting (contrast), kwargs={'scale': (0.6, 1.45)}, p=0.75, resolved={}, do_run=True, is_random=True)],
        [RandTransform(tfm=TfmCrop (crop_pad), kwargs={}, p=1.0, resolved={}, do_run=True, is_random=True)])
```

- 60,600 images in training set
- 15,150 images in validation set
- 25,250 images in test set
- Images resized to 224x224 for faster run-time
- Applied several transformations to reduce effect of such variations in images
- Normalized pixel values of images using ImageNet values

# Machine Learning Methodology

- ResNet-101
- Our premise relied upon updating learning rates
- 15 epochs - 5 epochs, update learning rates between each
- Unfreeze weights after 5 epochs



# Results (Validation Accuracy/Learning Rates)

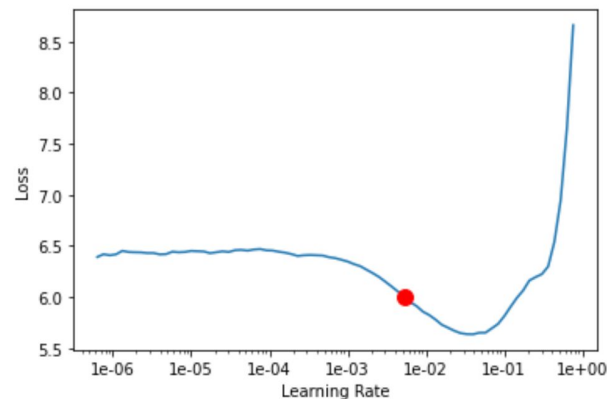
epoch	train_loss	valid_loss	accuracy	top_k_accuracy	time
0	2.010200	1.601293	0.587195	0.837030	19:24
1	1.653778	1.375897	0.637162	0.867855	18:46
2	1.381062	1.138769	0.696568	0.898812	18:52
3	1.120759	0.996335	0.732409	0.915380	19:29
4	0.998844	0.961965	0.741188	0.921056	19:35

First 5 epochs (frozen weights)

epoch	train_loss	valid_loss	accuracy	top_k_accuracy	time
0	0.441303	0.763256	0.801782	0.943696	20:13
1	0.515586	0.809359	0.795974	0.941320	20:34
2	0.392904	0.794260	0.802970	0.945215	20:16
3	0.293981	0.796327	0.806997	0.944752	20:25
4	0.244016	0.792827	0.810759	0.944422	20:34

```
[19] learn.recorder.plot(suggestion=True)
```

↳ Min numerical gradient: 5.25E-03  
Min loss divided by 10: 3.98E-03



Initial learning rate

Last 5 epochs

**Prediction/Actual/Loss/Probability**

bruschetta/tiramisu / 21.98 / 0.00



sushi/sashimi / 19.39 / 0.00



eggs\_benedict/shrimp\_and\_grits / 18.19 / 0.00



# Results (Top Losses)

omelette/croque\_madame / 17.86 / 0.00



poutine/beet\_salad / 17.17 / 0.00



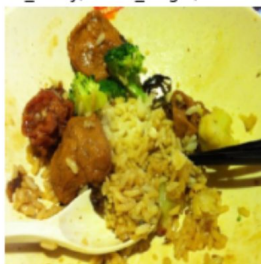
croque\_madame/french\_toast / 16.94 / 0.00



cup\_cakes/pancakes / 16.88 / 0.00



chicken\_curry/onion\_rings / 16.45 / 0.00



hamburger/bibimbap / 15.70 / 0.00





# Results (Confusion Matrix)

	Confusion matrix	
apple_pie	0	0
baby_back_ribs	0	0
baudouin	0	0
beef_carpaccio	0	0
beef_tartare	0	0
beef_walsh	0	0
beignets	0	0
beinwagel	0	0
bread_pudding	0	0
breakfast_burrito	0	0
bruschetta	0	0
caesal_salad	0	0
canoli	0	0
caprese_salad	0	0
carrot_cake	0	0
ceviche	0	0
cheese_plate	0	0
chicken_sake	0	0
chicken_curry	0	0
chicken_quesadilla	0	0
chicken_wings	0	0
chocolate_cake	0	0
chocolate_mousse	0	0
churros	0	0
clam_chowder	0	0
club_sandwich	0	0
crab_cakes	0	0
creme_brulee	0	0
croque_madame	0	0
cup_cakes	0	0
deviled_eggs	0	0
donuts	0	0
dumplings	0	0
esamane	0	0
egg_benedict	0	0
escargots	0	0
falefel	0	0
filet_mignon	0	0
fish_and_chips	0	0
filet_gras	0	0
french_fries	0	0
french_onion_soup	0	0
french_toast	0	0
fried_calamari	0	0
fried_rice	0	0
frozen_yogurt	0	0
ganic_bread	0	0
gnocchi	0	0
greek_salad	0	0
grilled_cheese_sandwich	0	0
grilled_salmon	0	0
guacamole	0	0
gruyere	0	0
hamburger	0	0
hot_and_sour_soup	0	0
hot_dog	0	0
nuevos_rancheros	0	0
hummus	0	0
ice_cream	0	0
lasagna	0	0
lobster_bisque	0	0
lobster_roll_sandwich	0	0
macaroni_and_cheese	0	0
macarons	0	0
miso_soup	0	0
muslets	0	0
nachos	0	0
onionette	0	0
onion_rings	0	0
oysters	0	0
pad_thai	0	0
paella	0	0
pancakes	0	0
panna_cotta	0	0
peking_duck	0	0
pho	0	0
pizza	0	0
port_chop	0	0
pudding	0	0
prime_rib	0	0
pulled_pork_sandwich	0	0
ramen	0	0
ravioli	0	0
red_velvet_cake	0	0
risotto	0	0
samosa	0	0
sashimi	0	0
scallops	0	0
seaweed_salad	0	0
shrimp_and_grits	0	0
red_szechuan	0	0
spaghetti_bolognese	0	0
spaghetti_carbonara	0	0
spring_rolls	0	0
steak	0	0
strawberry_shortcake	0	0
tacos	0	0
takeout	0	0
teriyaki	0	0
tiramisu	0	0
tuna_tartare	0	0
waffles	0	0

# Testing Accuracy

Calculated loss

[0.5405282, tensor(0.8570), tensor(0.9710)]

Top - 1 accuracy on test set

Top - 5 accuracy on test set

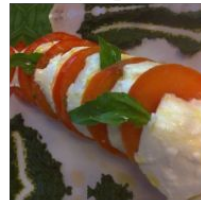
# Results (Ground Truth vs. Prediction)

Ground truth  
Predictions

red\_velvet\_cake  
red\_velvet\_cake



caprese\_salad  
caprese\_salad



fried\_rice  
huevos\_rancheros



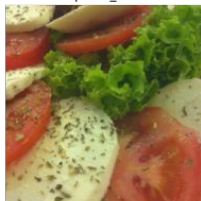
pho  
pho



huevos\_rancheros  
nachos



caprese\_salad  
caprese\_salad



dub\_sandwich  
dub\_sandwich



clam\_chowder  
clam\_chowder



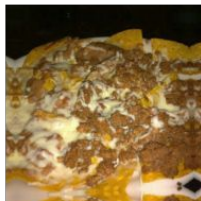
french\_toast  
french\_toast



garlic\_bread  
garlic\_bread



nachos  
nachos



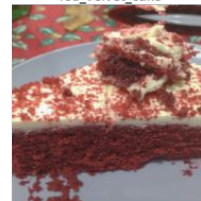
spring\_rolls  
spring\_rolls



tuna\_tartare  
chicken\_quesadilla



red\_velvet\_cake  
red\_velvet\_cake



macaroni\_and\_cheese  
macaroni\_and\_cheese



escargots  
escargots



edamame  
edamame



croque\_madame  
croque\_madame



carrot\_cake  
carrot\_cake



dumplings  
dumplings



# Finding Real Time Prices



[ 'https://www.amazon.com/Best-Sellers-Grocery-Gourmet-Food-Baklava/zgbs/grocery/724692011', 'https://www.amazon.com/baklava-pastry/s?k=baklava+pa' ]



amazon **Try Prime**

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EN Hello, Tim Account & Lists Returns & Orders Try Prime Cart

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Our most popular products based on sales. Updated hourly.

### Best Sellers in Baklava

- Any Department
- Grocery & Gourmet Food
  - Breads & Bakery
    - Desserts
      - Baklava**
      - Brownies
      - Cupcakes
      - Fudge
      - Pies
      - Sponge Puddings
      - Tarts

#1		#2		#3	
	Baklava Gift Box 50 Pc. Signature Collection (Black or White) ★★★★☆ 190 \$27.95		Luxury Turkish Baklava Traditional Assortment Pistachio Gift Box 27 oz. Two Layer 52 pcs - Best... ★★★★☆ 165 \$36.90		Simply BKLVA- Assorted Premium Baklava (5.29oz) ★★★★☆ 40 \$8.41 ✓prime
#4		#5		#6	



# Finding Real Time Prices



['<https://www.amazon.com/Best-Sellers-Grocery-Gourmet-Food-Baklava/zgbs/grocery/724692011>', '<https://www.amazon.com/baklava-pastry/s?k=baklava+pastry>']



```
<div class="a-icon-row a-spacing-none">
  <a class="a-link-normal" href="/product-reviews/B07C6MC2YV" title="4.1 out of 5 stars">
    <i class="a-icon a-icon-star a-star-4 aok-align-top"><span class="a-icon-alt">4.1 out of 5 stars</span></i>
  </a>
  <a class="a-size-small a-link-normal" href="/product-reviews/B07C6MC2YV">4</a>
</div>
<div class="a-row"><a class="a-link-normal a-text-normal" href="/Almond-Basbousa-Hareesa-Nammoura-Semolina/dp/B07C6MC2YV?_encoding=UTF8&psc=1"><span class="a-size-base a-color-price"><span class="p13n-sc-price">$14.99</span></span>
<div aria-hidden="true" class="p13n-sc-truncate p13n-sc-line-clamp-2" data-rows="2">
  Baklava (Baklava) w/Pistachios, 28-30 Pieces
</div>
</a>
<div class="a-icon-row a-spacing-none">
  <a class="a-link-normal" href="/product-reviews/B0002HDM0Q" title="4.4 out of 5 stars">
    <i class="a-icon a-icon-star a-star-4-5 aok-align-top"><span class="a-icon-alt">4.4 out of 5 stars</span></i>
  </a>
  <a class="a-size-small a-link-normal" href="/product-reviews/B0002HDM0Q">45</a>
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<div aria-hidden="true" class="p13n-sc-truncate p13n-sc-line-clamp-2" data-rows="2">
  Al Bohsali 1870- Premium Pistachio Baklava Mix 32 Pieces
</div>
</a>
<div class="a-icon-row a-spacing-none">
  <a class="a-link-normal" href="/product-reviews/B07CGBJ8TZ" title="4.5 out of 5 stars">
    <i class="a-icon a-icon-star a-star-4-5 aok-align-top"><span class="a-icon-alt">4.5 out of 5 stars</span></i>
  </a>
  <a class="a-size-small a-link-normal" href="/product-reviews/B07CGBJ8TZ">179</a>
</div>
<a class="a-link-normal a-text-normal" href="/Al-Bohsali-Premium-Pistachio-Baklava/dp/B07CGBJ8TZ?_encoding=UTF8&psc=1"><span class="a-color-secondary">1 offer from <span class="a-size-base a-color-price"><span class="p13n-sc-price">
<div aria-hidden="true" class="p13n-sc-truncate p13n-sc-line-clamp-2" data-rows="2">
  Custom Assorted Baklava - Large Tray
</div>
</div>
</a>
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    <i class="a-icon a-icon-star a-star-5 aok-align-top"><span class="a-icon-alt">5.0 out of 5 stars</span></i>
  </a>
  <a class="a-size-small a-link-normal" href="/product-reviews/B078VCZ9D5">2</a>
</div>
```

# Web-Scraping Result

```
price: $36.90 product name: Luxury Turkish Baklava Traditional Assortment Pistachio Gift Box 27 oz. Two Layer 52 pcs - Best Baklav
price: $8.41 product name: Simply BKLVA- Assorted Premium Baklava (5.29oz)
price: $27.95 product name: Baklava Gift Box 30 Pc. Signature Collection (Black or White)
price: $23.90 product name: Luxury Baklava Sampler Set 10 Oz. (22 pcs.) Mughe Gourmet Selection Baklava Turkish Pistachio Sweets
price: $29.99 product name: Baklava Assortment - 63 Pcs.
price: $32.00 product name: Al Bohsali 1870- Premium Baklava Mix 36 Pieces
price: $17.99 product name: Baklava (Pistachio, 12 Pack)
price: $17.99 product name: Baklava (Walnut, 12 Pack)
price: $14.99 product name: Almond Basbousa/Hareesa/Nammoura Semolina Cake
price: $23.50 product name: Baklava (Baklava) w/Pistachios, 28-30 Pieces
price: $41.00 product name: Al Bohsali 1870- Premium Pistachio Baklava Mix 32 Pieces
price: $35.00 product name: Custom Assorted Baklava - Large Tray
price: $29.99 product name: Baklava Assortment - Sugar Free - 63 Pcs
price: $77.00 product name: Al Bohsali 1870- Premium Pistachio Baklava Mix 56 Pieces
price: $60.00 product name: Al Bohsali 1870- Premium Baklava Mix 60 Pieces
price: $39.99 product name: Baklava (Baklava) w/Walnuts, 28-30 Pieces
price: $16.00 product name: Al Bohsali Maamoul Mix 24 pc. (8 of each)
price: $19.00 product name: Al Bohsali Maamoul Pistachio 24 pc.
price: $36.00 product name: Al Bohsali 1870- Premium Pistachio Baklava 24 Pieces
price: $36.00 product name: Baklava Cashews - 60 Pc.
price: $41.00 product name: Laodicea Greek Baklava
price: $25.95 product name: Baklava Walnuts - 60 Pc.
price: $11.49 product name: Fard Baklava, 10 Oz
price: $27.95 product name: Baklava Assortment - 29 Pc.
price: $15.99 product name: Barazek Sesame Seed and Pistachio Cookies - 60 Pcs Signature Gift Box
price: $16.95 product name: Baklava (Pecan, 12 Pack)
price: $18.99 product name: Al Bohsali 1870- Premium Pistachio Baklava 42 Pieces
price: $17.99 product name: Custom Assorted Baklava - Half Tray
```