Food Interpolation using GANs

Main Idea

- Food dataset with labels
- Train GANS with auxiliary classifier
- Interpolate between Burger  and Pizza 

Initial Setup

- Dataset: Food 101
- GAN setup from WGAN-GP paper
- Use auxiliary classifier to encode classes
- GPU: GeForce GTX 1080 Ti (11GB Mem.)

Generator $G(z)$			
	Kernel size	Resample	Output shape
z	-	-	128
Linear	-	-	$128 \times 4 \times 4$
Residual block	[3×3] × 2	Up	$128 \times 8 \times 8$
Residual block	[3×3] × 2	Up	$128 \times 16 \times 16$
Residual block	[3×3] × 2	Up	$128 \times 32 \times 32$
Conv, tanh	3×3	-	$3 \times 32 \times 32$

Critic $D(x)$			
	Kernel size	Resample	Output shape
Residual block	[3×3] × 2	Down	$128 \times 16 \times 16$
Residual block	[3×3] × 2	Down	$128 \times 8 \times 8$
Residual block	[3×3] × 2	-	$128 \times 8 \times 8$
Residual block	[3×3] × 2	-	$128 \times 8 \times 8$
ReLU, mean pool	-	-	128
Linear	-	-	1

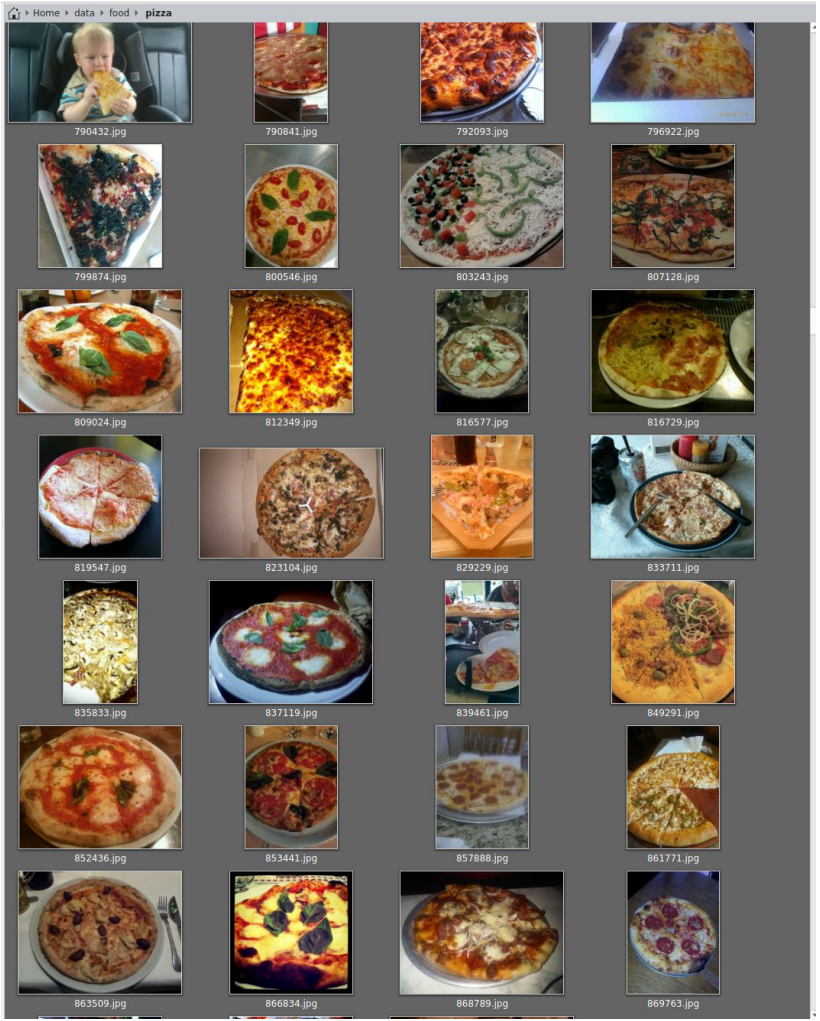
First Results

- Iterations: 16.000
- Resolution: 64 x 64
- Batch Size: 256

Issues

- Results with a lot of artifacts
- Weird patterns
- Bad colors
- Dataset not well suited for GANs!

→ Download images from Google


Home data food pizza
790432.jpg
790841.jpg
792093.jpg
796922.jpg
799874.jpg
800546.jpg
803243.jpg
807128.jpg
809024.jpg
812349.jpg
816577.jpg
816729.jpg
819547.jpg
823104.jpg
829229.jpg
833711.jpg
835833.jpg
837119.jpg
839461.jpg
849291.jpg
852436.jpg
853441.jpg
857888.jpg
861771.jpg
863509.jpg
866834.jpg
868789.jpg
869763.jpg


Home data downloads pizza
1.Eq_it-na_pizza-margherita_sep2005...
2.55cd28cae8ee78fe1e52ab1adc9eaf...
3.pizza-margherita.jpg
4.pizza368_v-contentgross.jpg
5.pizza_fresca.jpg
6.Asset_817968.jpg
7.delish-keto-pizza-073-1544039876.j...
8.pizza-3.jpg
9.pizza_left.png
10.rez-edeka-pizza-funghi-rezept-i-p-r...
11.4282-pizza-margherita.jpg
12.BFV36537_CC2017_2IngredintDou...
13.pizza-3000274_1920.jpg
14.Pizza%20Margherita.jpg
15.der-beste-pizzateig.jpg
16.pizza-bild.jpg
17.pizza-chicken-hollandaise.jpg
18.1200px-Greek_pizza_%281%29.jpg
19.bildschirmfoto_2018-11-19_um_16...
20.mono_share_main_01-e15449836...
21.b0f02e58-2b4e-4a26-ad8b-30e16...
22.pizza-pizzateig-selber-machen-cc0...
23.product_images_350x350_product...
24.123651-pizza-gorgonzola-feige-0.jpg

Home ▸ data ▸ food ▸ **hamburger**


167971.jpg


169191.jpg


169479.jpg


170292.jpg


172005.jpg


175584.jpg


177522.jpg


177861.jpg


178840.jpg


179593.jpg


184751.jpg


184955.jpg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201200.jpg


204552.jpg


209001.jpg


210405.jpg


212746.jpg


214437.jpg


214601.jpg


215037.jpg


215349.jpg


216853.jpg


217855.jpg

Home ▸ data ▸ downloads ▸ **burger**


65.anne-burrell-killer-turkey-burger-t...


66.Schweinebauch-Bacon-Burger.jpg


67.mio_rezepte_1117_0051_v4_121-5...


68.gua-bao-burger.jpg


69.anamma_vegan_burger_coleslaw.j...


70.Best-Burger-4.jpg


71.exps28800_UG143377D12_18_1b...


72.5c420211b492cb5cdb1d88d4-750...


73.Burger-Pool-Grill.jpg


74.190524-classic-american-cheeseb...


75.burger-rezept-img-151108.jpg


76.RP04_24_05_halloumiBurger_Title...

77.17980-suesse-fruechte-burger.jpg

78.151638762-f-3_2-w-960.jpg

79.burger-bild.jpg

80.lecker_muss_es_sein_10-2017_-Bu...

81.Asian-Sticky-Belly-Pork-Burger-wit...

82.So-schmeckt-der-neue-Vegan-Bur...

83.DSC_0127ed2.jpg

84.20150728-homemade-whopper-fo...

85.burger-rezepte.jpg

86.Burger_680x453px.jpg

87.1cddcb3c1273ff86644d2be1c52c2...

88.Hamburger_%28black_bg%29.jpg

89.burger-double-cap.png

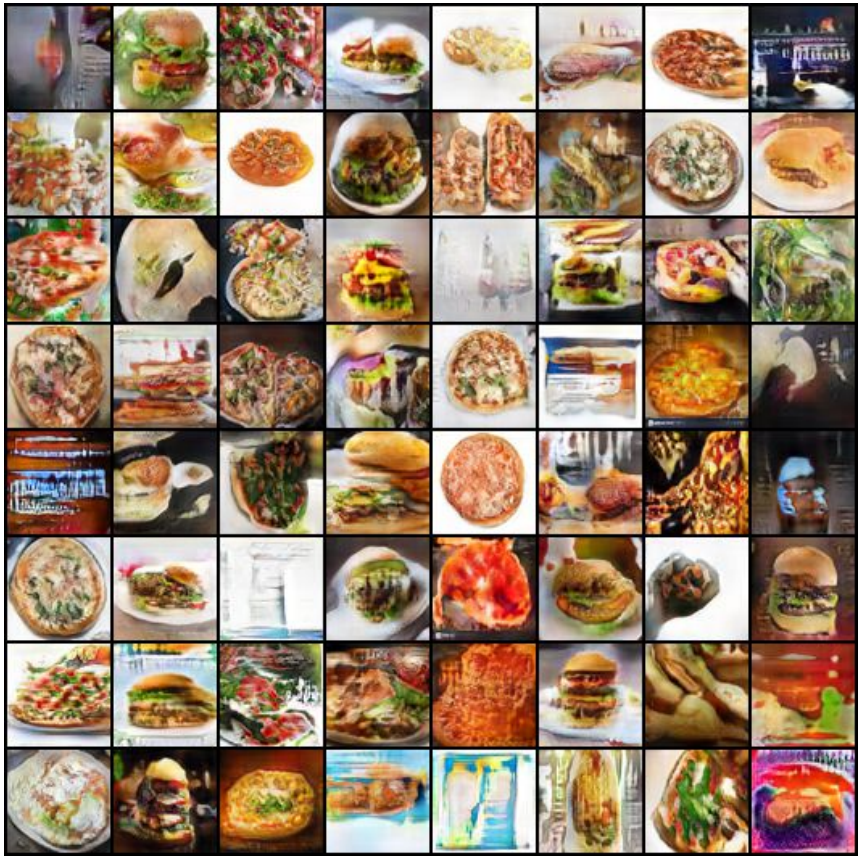
90.2015-07-swiss-burger.jpg

91.burger-buns-selber-machen-850x...

92.16_463_klassiker_deluxe_app_pro...

Second Results

- Iterations: 16.000
- Resolution: 64 x 64
- Batch Size: 256



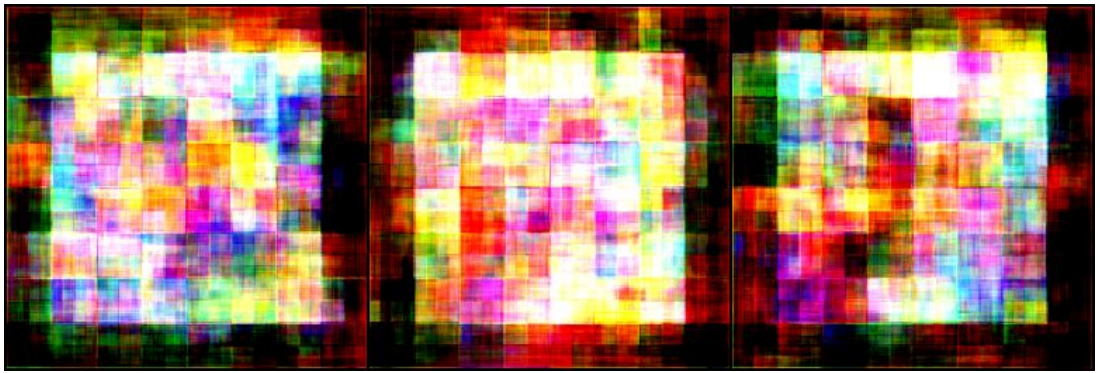
First Interpolations

First Interpolations

Lets go big !

Third Results

- Iterations: < 10.000
- Resolution: 256 x 256
- Batch Size: 16



Solution

- Use progressive growing GAN architecture
  - Start with 4x4
  - Train 50 epochs stabilizing
  - Upscale
  - Train 50 epoch fade-in
  - Repeat!

Fourth Results

- Epochs: 700
- Res.: 256 x 256

- Adaptive Batch Size:
  - **4x4** → *1024*, **8x8** → *1024*, **16x16** → *512*, **32x32** → *256*, **64x64** → *128*, **128x128** → *50*, **256x256** → *30*

Interpolations