APRENDIZAJE DE MÁQUINAS

Data Labellin’ or Data Annotation

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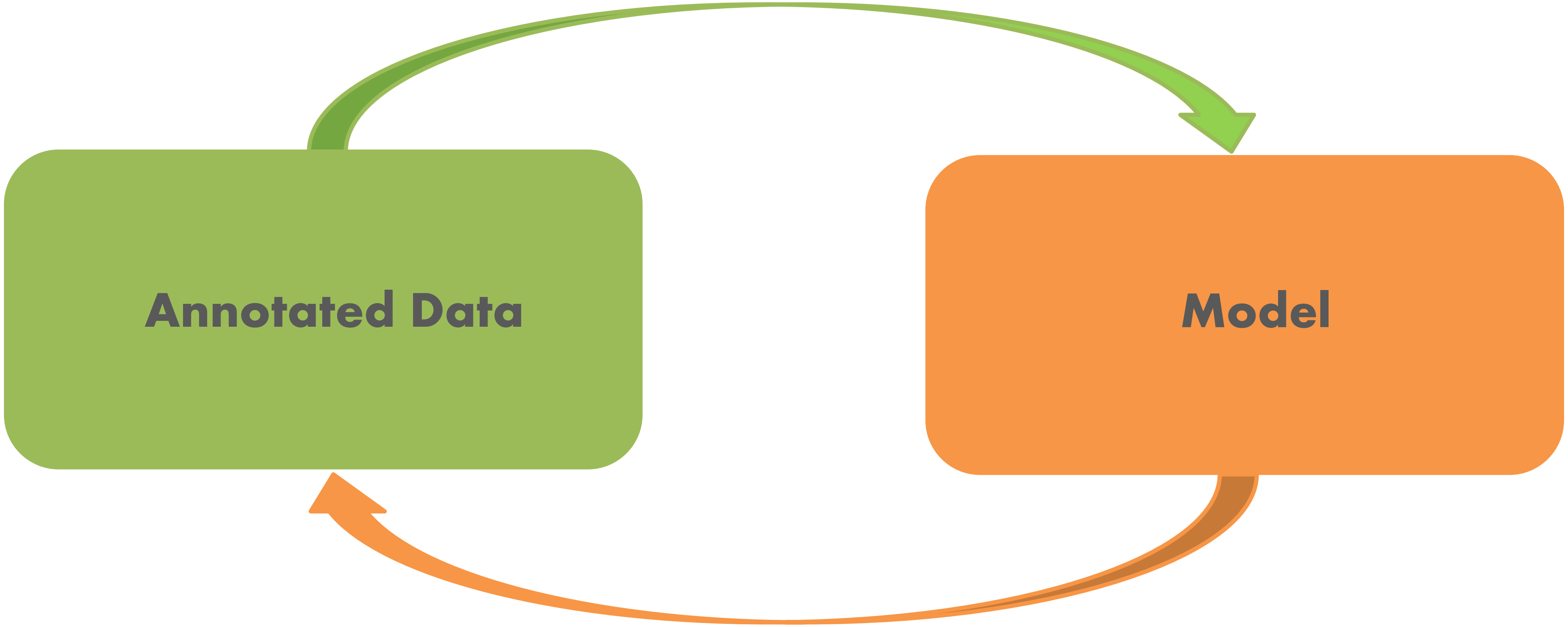
https://github.com/srobles05/3008422-AprendizajeDeMaquinas

Gidia
Grupo de I+D
en Inteligencia Artificial

UNIVERSIDAD
NACIONAL
DE COLOMBIA

A data – model tandem



Annotated Data

Model

$a11X1 + a12X2 +.....+a1nXn = w1$
$a21X1 + a22X2 +.....+a2nXn = w2$
.
.
.
$an1X1 + an2X2 +.....+annXn = wn$

$$X + Y = 80$$
$$X/2 – 3Y = 28$$

In a DNN
AX = b, donde: A,X,b son matrices o tensores, A son los parametros o los pesos, b son los bias (interceptos)

Training Data

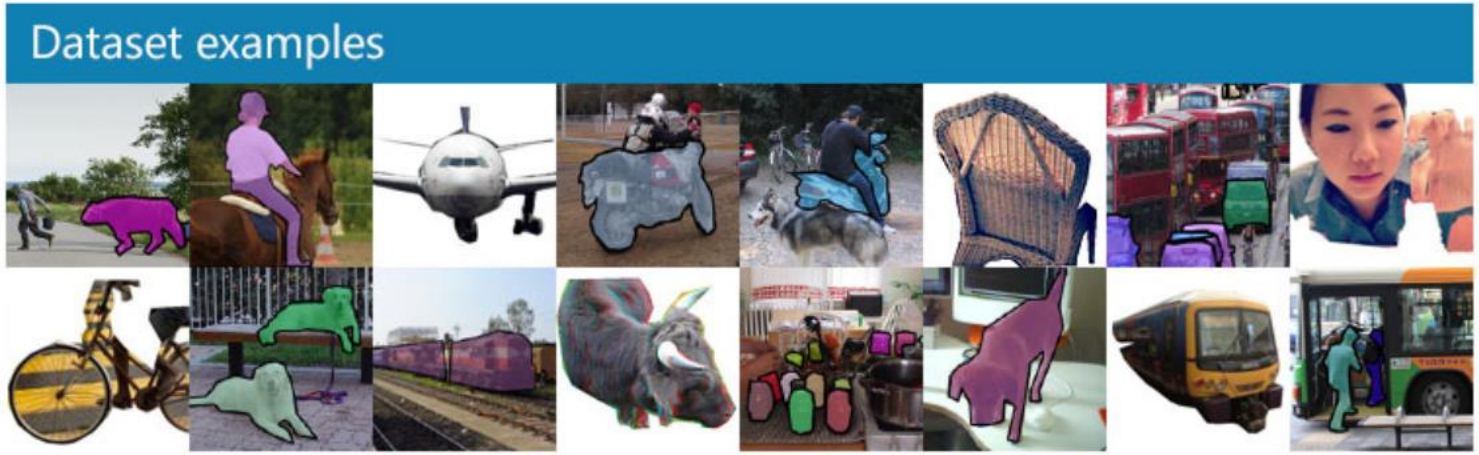
Famous Datasets

Mnist: handwritten numbers (http://yann.lecun.com/exdb/mnist/) Yann LeCun, et all

Coco: common objects in context for detection & segmentation (https://cocodataset.org/#home)

Planet: Multiclassification satellite from amazon rainforest (https://www.kaggle.com/nikitarom/planets-dataset)

Camvid: Segmentation Street datasets (http://mi.eng.cam.ac.uk/research/projects/VideoRec/CamVid/)



Ways to collect data

- From the field (primary)

- From the Internet (secondary)

Different ways of annotate

- In the file name: it's the most common: ex. dog.jpg, horse.jpg, cat.jpg

- In a separate file: tipically in a .csv file

-In a field of a table: target

-In the whole image itself: segmentation

Search and scroll Google Images

-Be specific, less manual pruning you will have to do.

-The maximum number of images Google Images shows is 700.

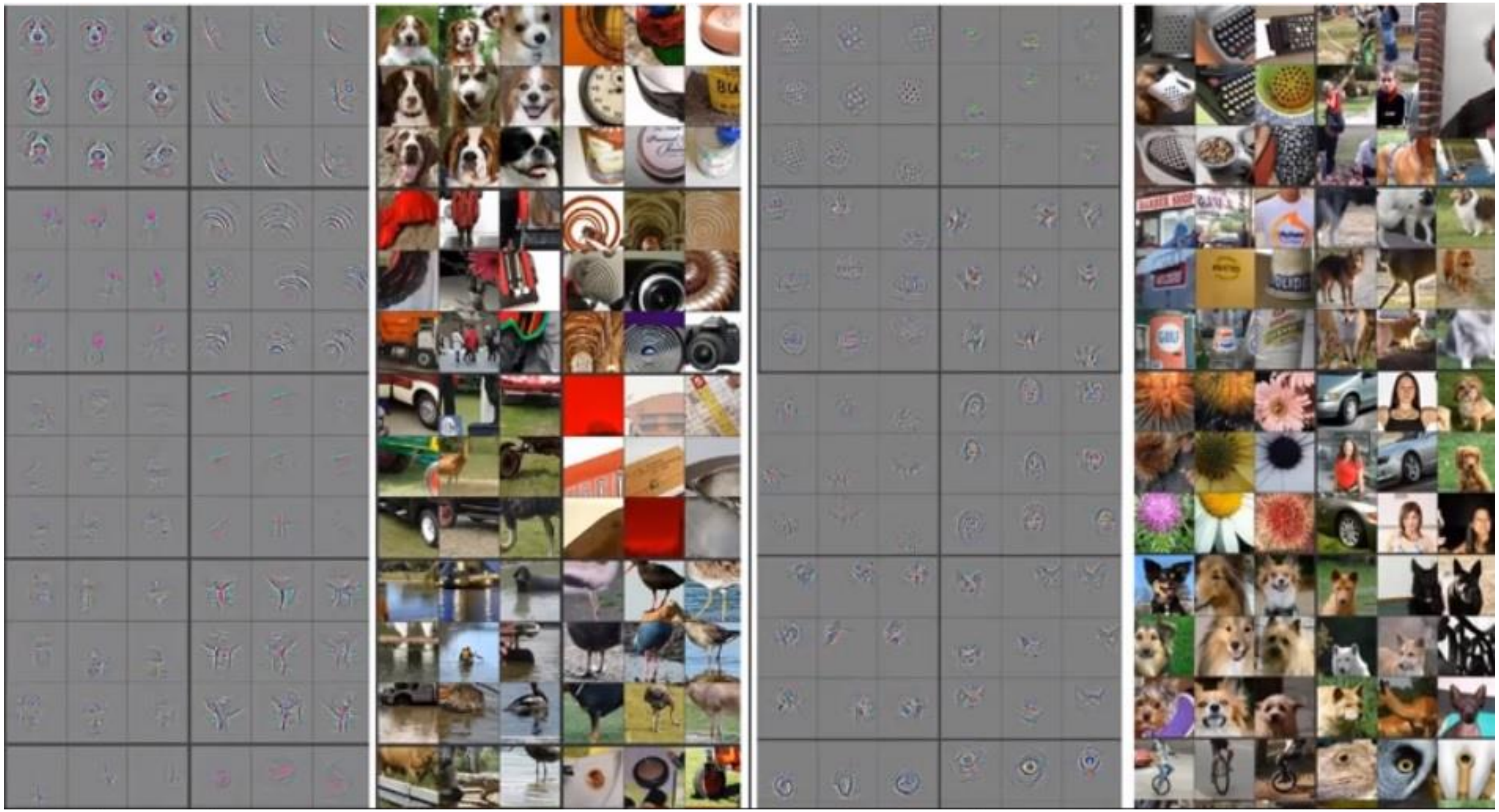
-Put things you want to exclude into the search query using (-)

-Limit your results to show only photos by clicking on Tools and selecting Photos from the Type dropdown.

ctrl+shift+j

Transfer Learning

```
learn = create_cnn(data, models.resnet34, metrics=error_rate)
```



What is enough data?

If hyper parameters: architecture, epochs and learning rate are ok but model accuracy is still not good, below 80%

You need more data !!!!

How to get more data?

Data Augmentation and sintetic data

-Programming is the solution, there is little workaround

-Python is more than ok: PIL, CV2, and imageo modules do the trick!

-Typical transformations are: rotate=flip, scale (affine), warping

This can multiply actual data by 4 !

- Crappify and blurring is easy.

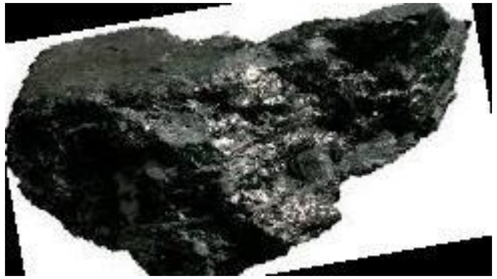
Data Augmentation = Image Transformations (Geometric, Color, etc)

Original

Rotated

Flip

Warped



```
i = Image.open(os.path.join(mypath, f))
print(f, i.size, i.mode)
i10 = i.rotate(10)
i10.save(os.path.join(mypath,'rot10{}.jpg'.format(fname)))
iflip = i.transpose(Image.FLIP_LEFT_RIGHT)
iflip.save(os.path.join(mypath,'flip{}.jpg'.format(fname)))
ifvert = i.transpose(Image.FLIP_TOP_BOTTOM)
ifvert.save(os.path.join(mypath,'fvert{}.jpg'.format(fname)))
iwarp = i.transform((new_width, height), (Image.AFFINE),(1, m, -xshift if m > 0 else 0, 0, 1, 0),
          (Image.BICUBIC))
```

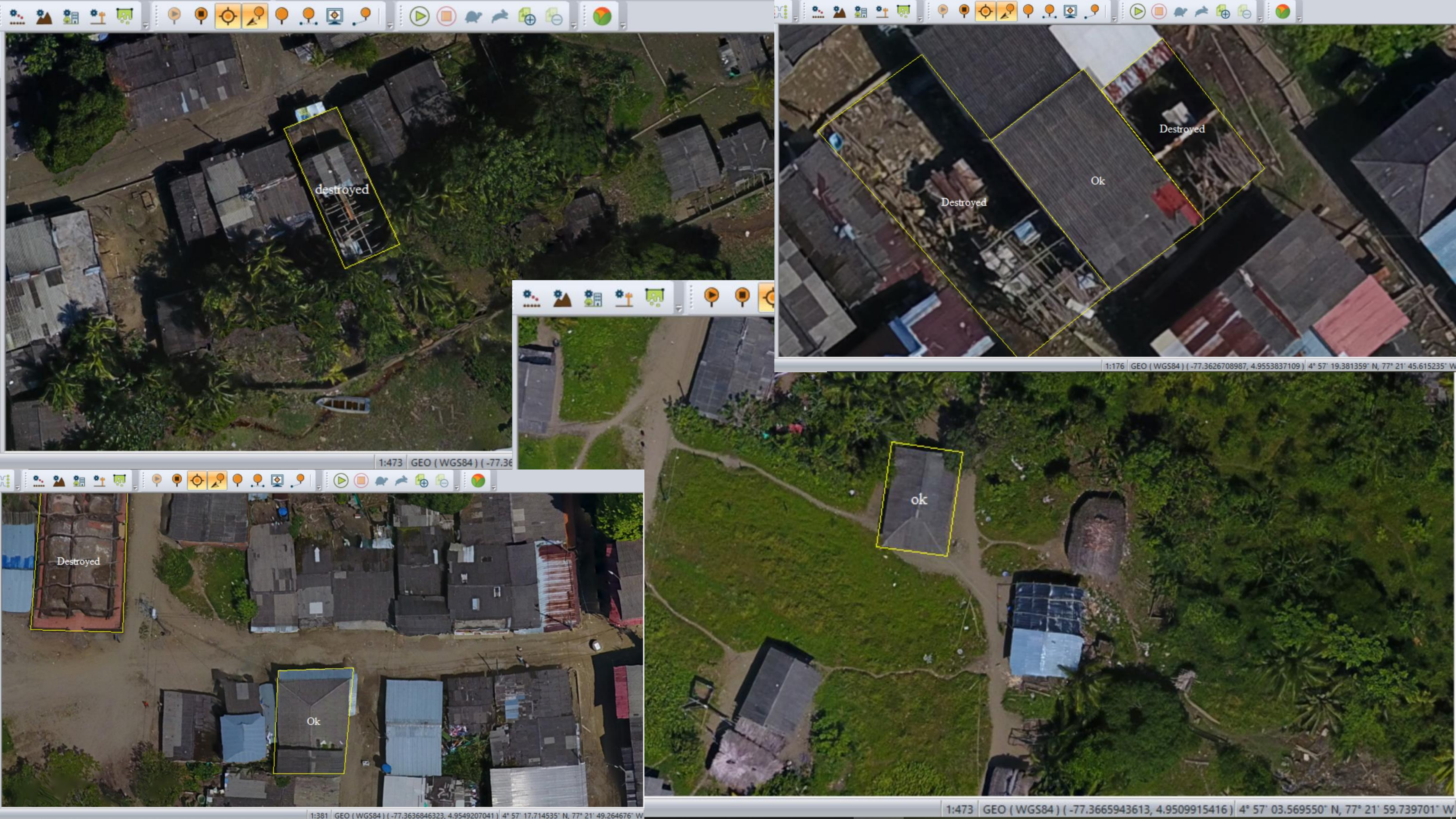
Examples of problems that can be solved

Binary classification: Damaged/No Damaged--------Prob 1/0 (CNN)

Multi classification: Rock classification, Minerals, vipers, trees, outcrops, house assessment--------Prob Treshold above 0.6 (CNN)

Segmentation: each pixel is assigned a value into a category (CNN encoding-decoding)

Image Generation: Cuttoff, marks & stinks, colorization, improve resolution (more advanced), Neural Style Transfer: GANs

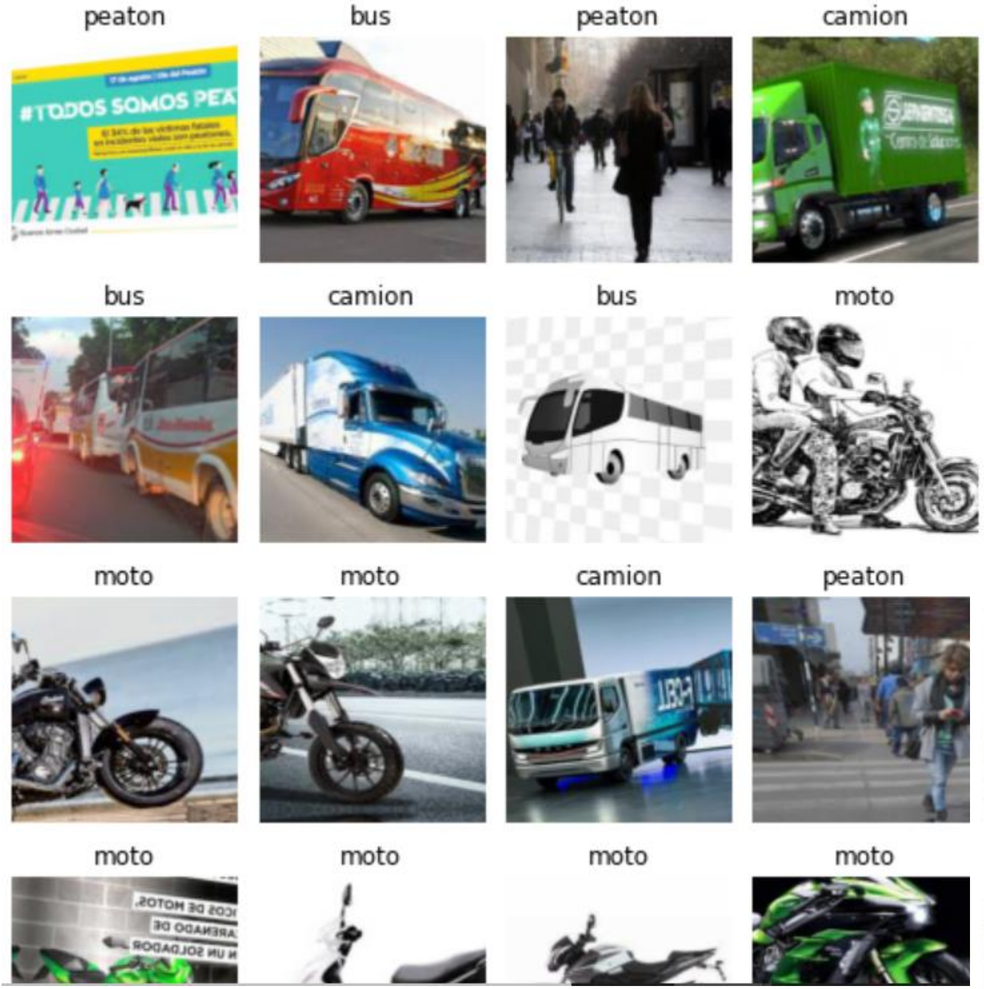


1:473 | GEO (WGS84) (-77.36

1:176 | GEO (WGS84) (-77.3626708987, 4.9553837109) | 4° 57' 19.381359" N, 77° 21' 45.615235" W

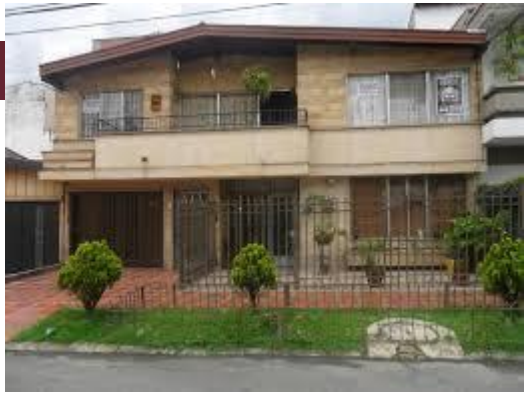
1:381 | GEO (WGS84) (-77.3636846323, 4.9549207041) | 4° 57' 17.714535" N, 77° 21' 49.264676" W

1:473 | GEO (WGS84) (-77.3665943613, 4.9509915416) | 4° 57' 03.569550" N, 77° 21' 59.739701" W

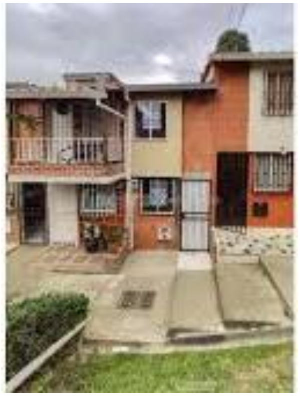

peaton
bus
peaton
camion
#TODOS SOMOS PEA
bus
camion
bus
moto
moto
moto
camion
peaton
moto
moto
moto
moto

carbon
rhyolite
basalt
andesite
carbon
rhyolite
andesite
sandstone
schist

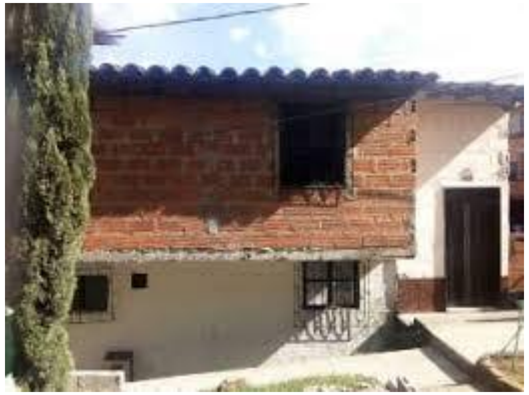
scottish_terrier
Sphynx
staffordshire_bull_terrier
wheaten_terrier
pug
Siamese
keeshond
British_Shorthair
havanese



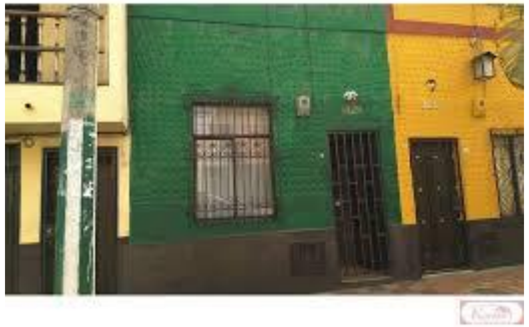
con acabados, garaje, ante jardín, varios pisos, grande, alto valor



con acabados, no garaje, no ante jardín, varios pisos, pequeña, medio valor



sin acabados, no garaje, no ante jardín, varios pisos, mediana, bajo valor



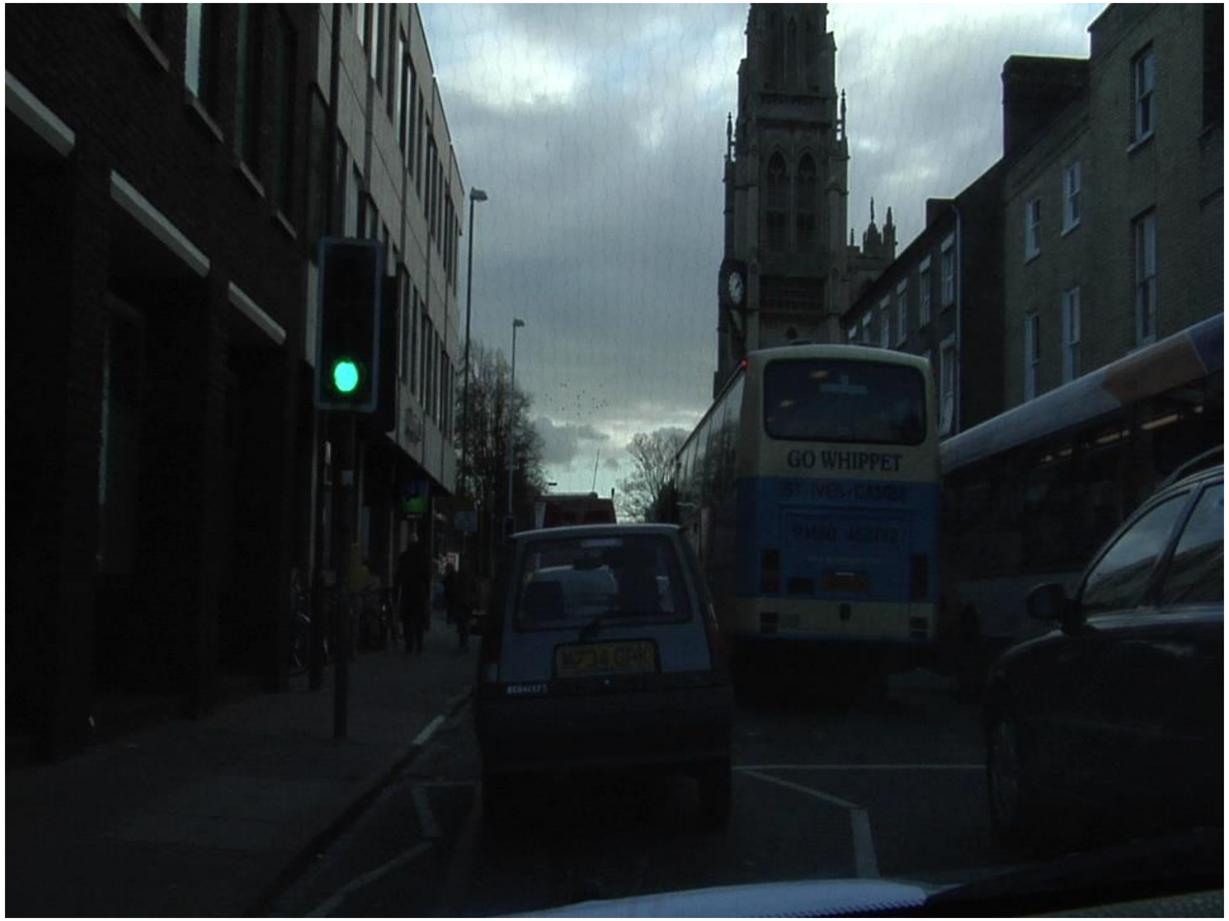
con acabados, no garaje, no ante jardín, 1 piso, pequeña, bajo valor

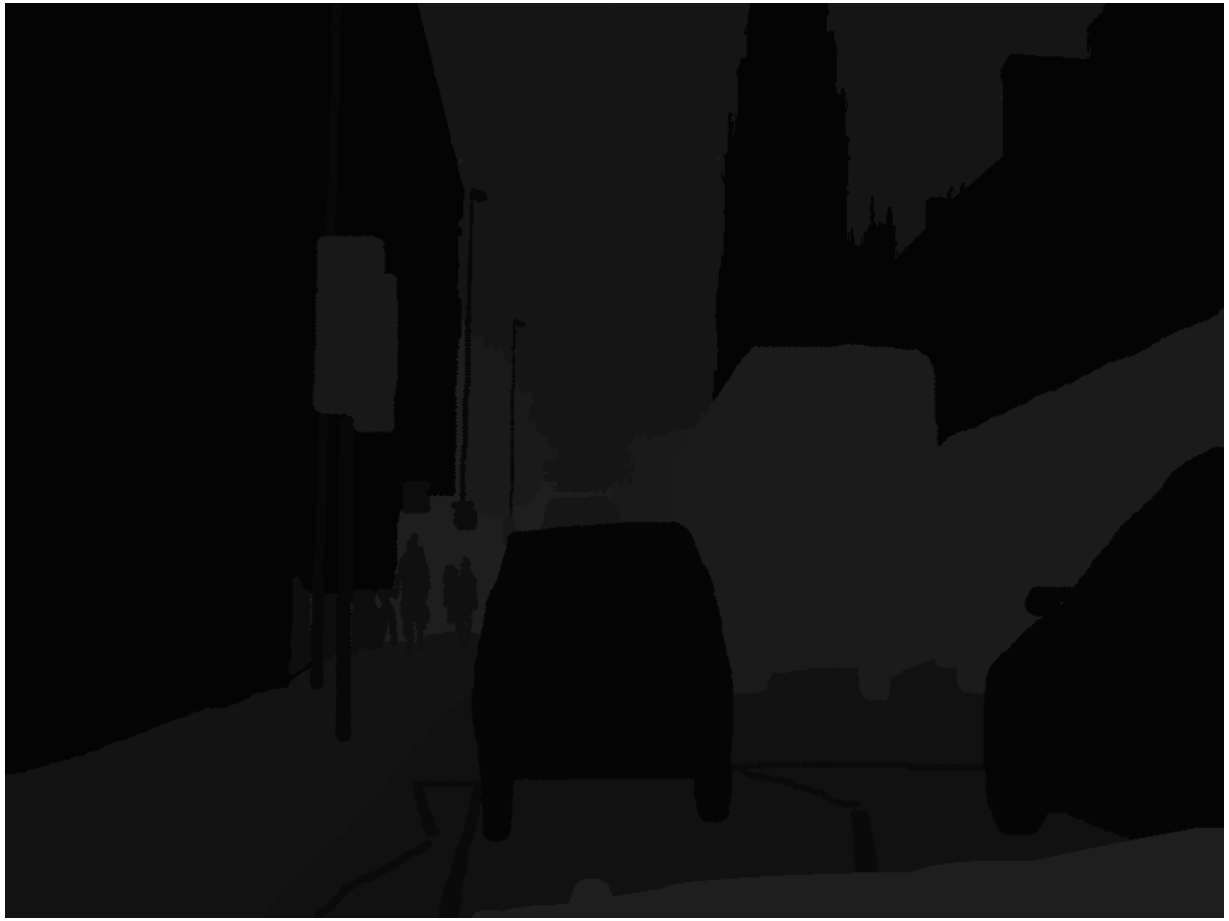
alta pendiente, no cobertura, alto peso, muy alto riesgo

alta pendiente, no cobertura, alto peso, muy alto riesgo

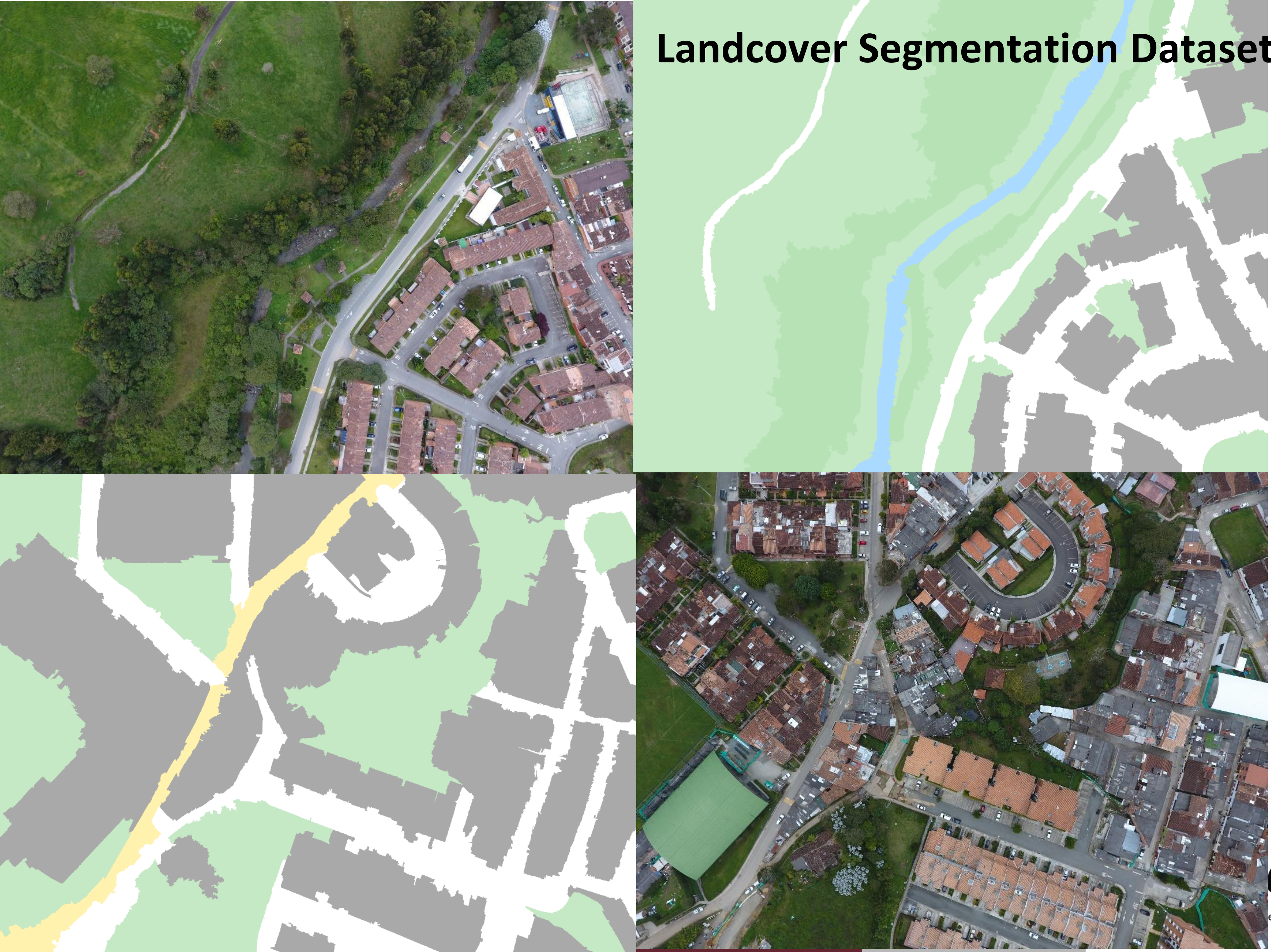
alta pendiente, no cobertura, bajo peso, muy bajo riesgo

Camvid: Streets Segmentation Dataset

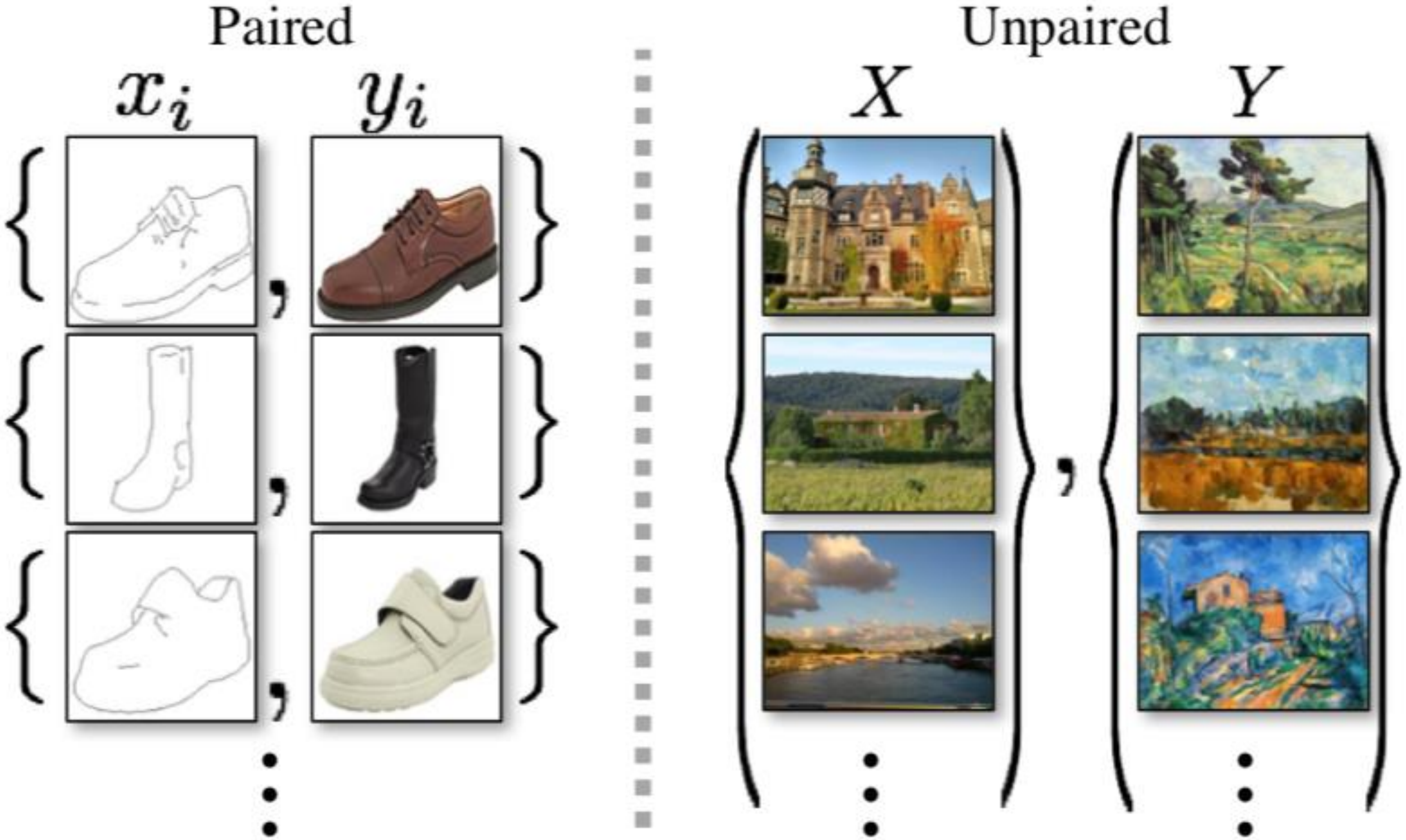




Landcover Segmentation Dataset



Types of training datasets for image generation



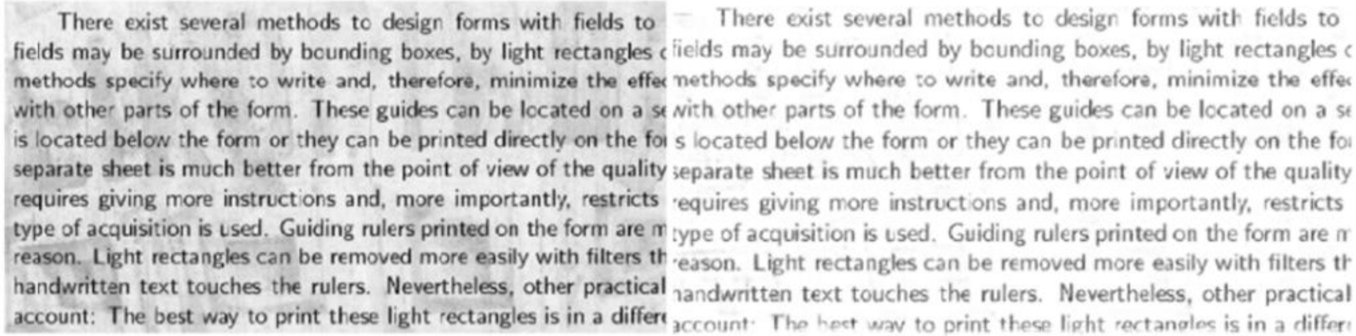
[Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks](#)
[Jun-Yan Zhu](#)*, [Taesung Park](#)*, [Phillip Isola](#), [Alexei A. Efros](#)
Berkeley AI Research Lab, UC Berkeley
In ICCV 2017. (* equal contributions)

Image Translation: Cuttoff-marks & stinks, colorization, improve resolution, NST (neural style transfer)

Pix to pix

Supervised Learning !

Easy to learn and train, difficult to get data



There exist several methods to design forms with fields to
fields may be surrounded by bounding boxes, by light rectangles c
methods specify where to write and, therefore, minimize the effec
with other parts of the form. These guides can be located on a se
is located below the form or they can be printed directly on the fo
separate sheet is much better from the point of view of the quality
requires giving more instructions and, more importantly, restricts
type of acquisition is used. Guiding rulers printed on the form are m
reason. Light rectangles can be removed more easily with filters th
handwritten text touches the rulers. Nevertheless, other practical
account: The best way to print these light rectangles is in a differ

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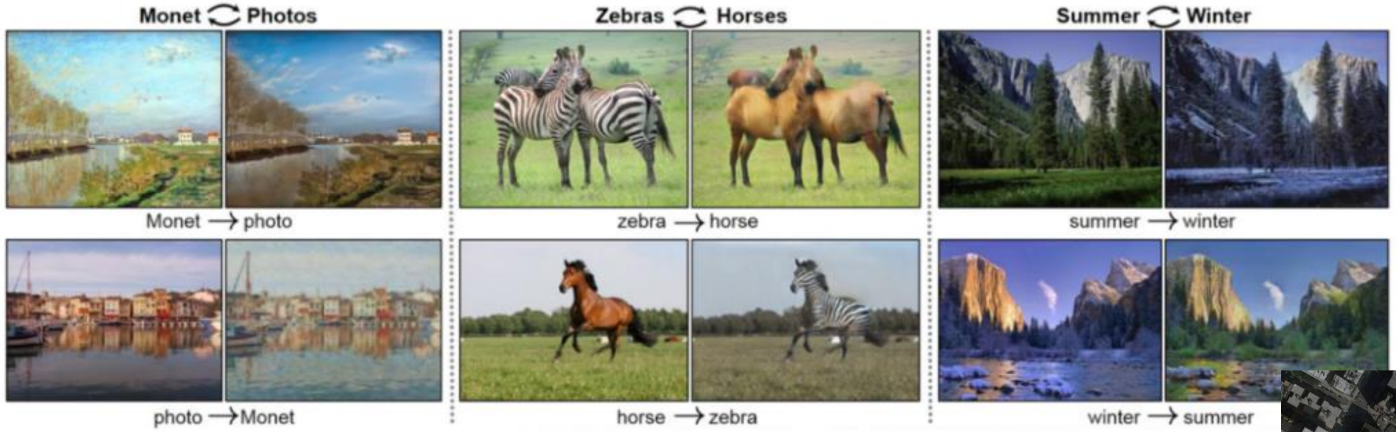
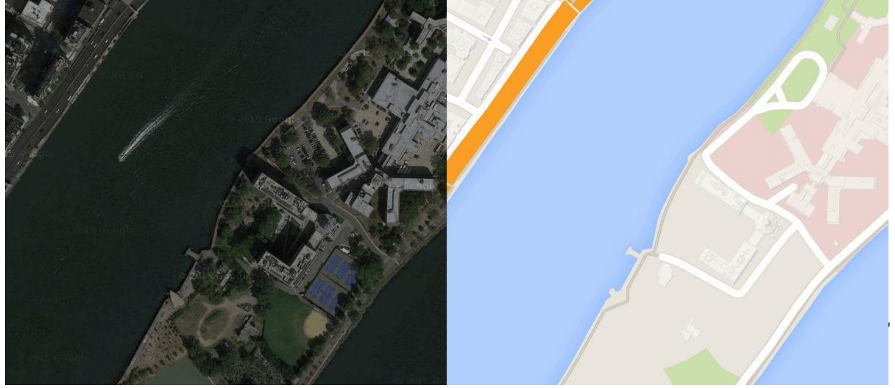
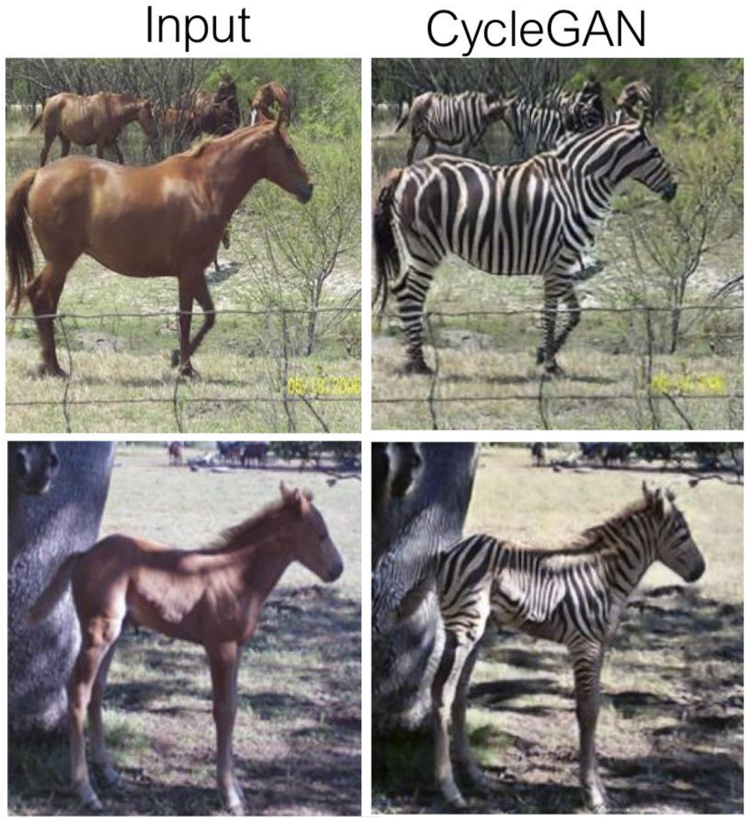




Pix to pix image translation, Phillip Isola et al
In ICCV 2017.



Object transfiguration

Unsupervised Learning !

Difficult to train and learn but easy to get training data

Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks
Jun-Yan Zhu*, Taesung Park*, Phillip Isola, Alexei A. Efros
Berkeley AI Research Lab, UC Berkeley
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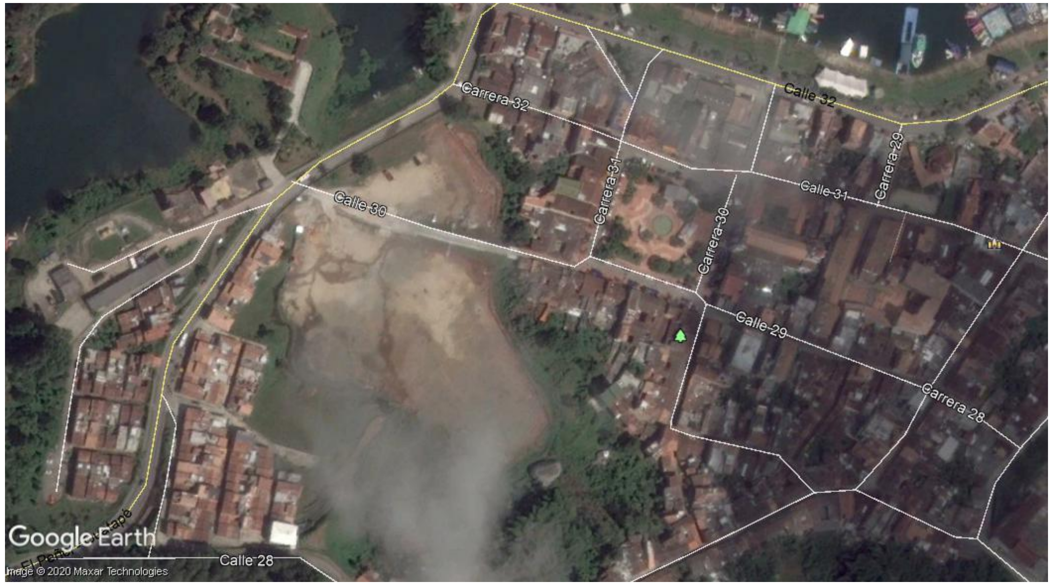
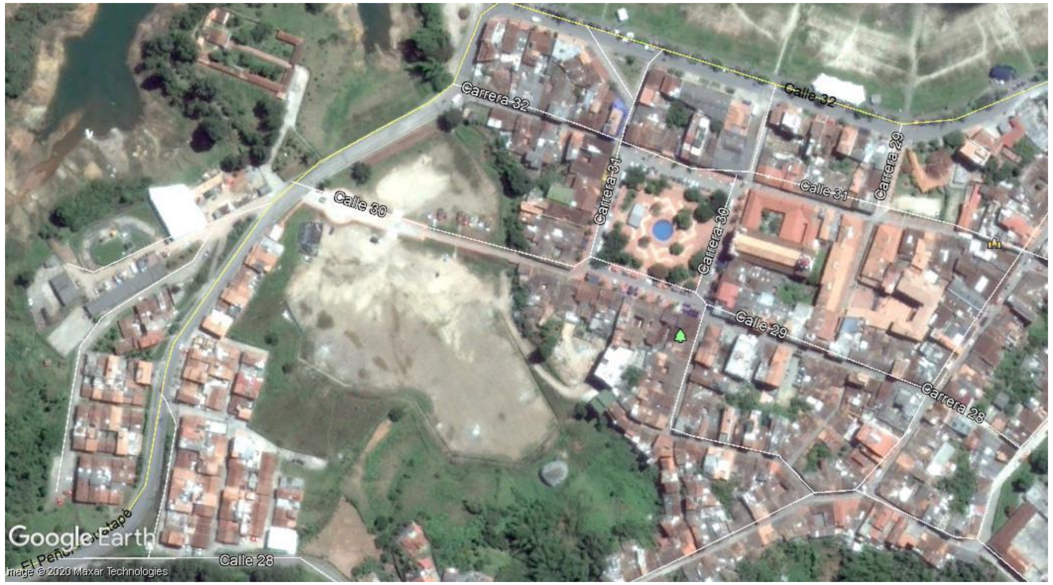
34
62
41

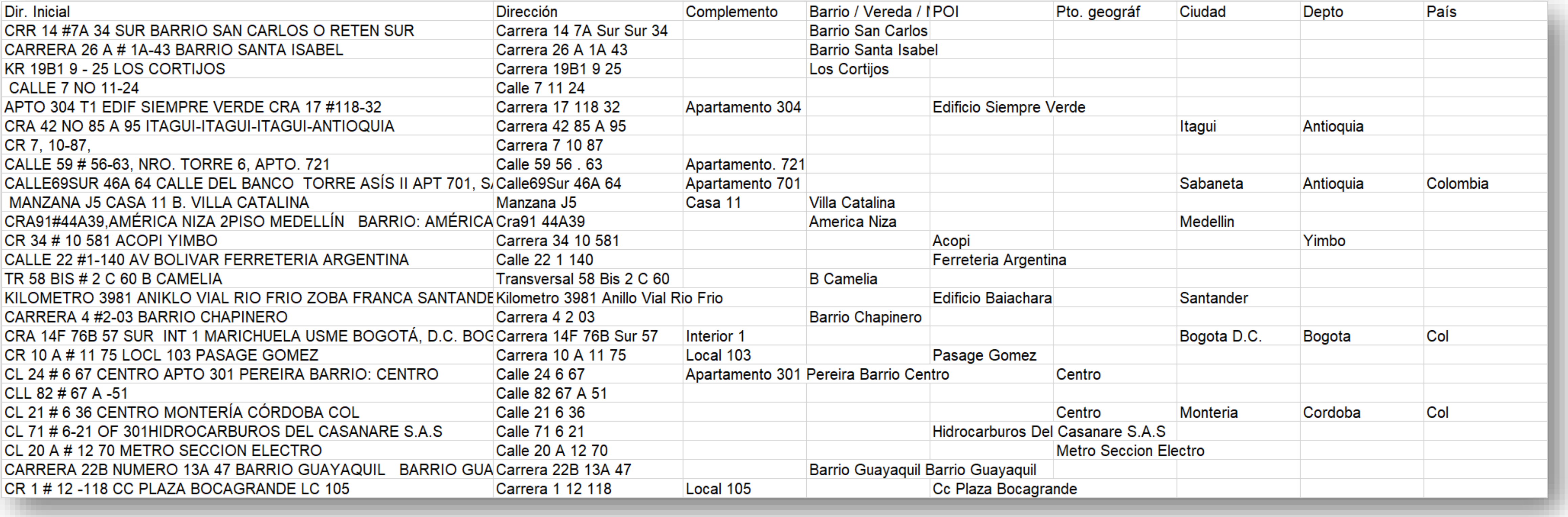
Labelling Time (research topic)



?



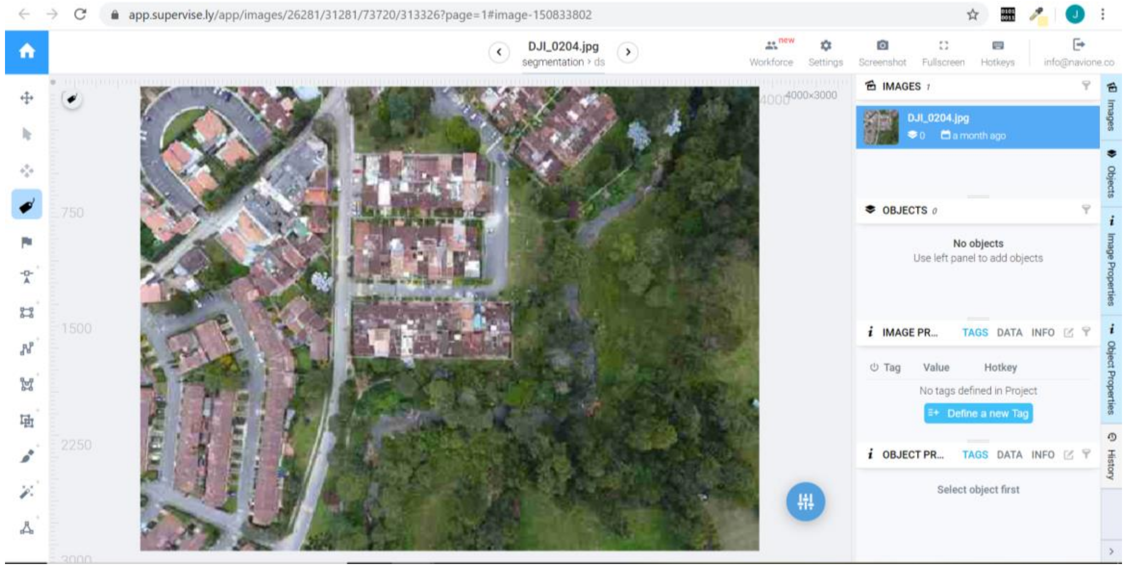
What about data in text and tables?



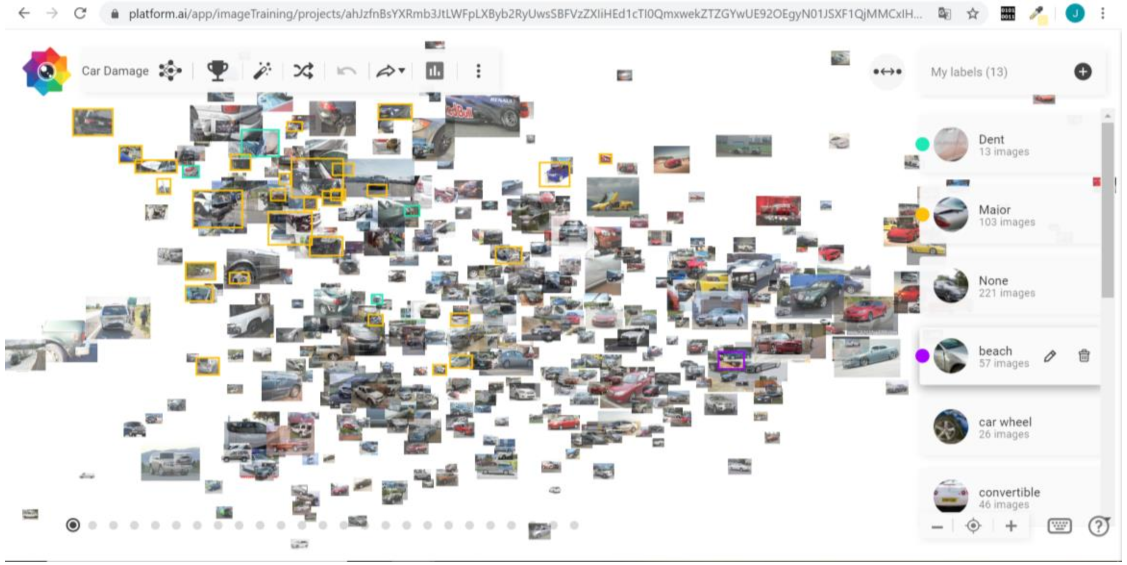
Dir. Inicial	Dirección	Complemento	Barrio / Vereda / I	POI	Pto. geográf	Ciudad	Depto	País
CRR 14 #7A 34 SUR BARRIO SAN CARLOS O RETEN SUR	Carrera 14 7A Sur Sur 34		Barrio San Carlos					
CARRERA 26 A # 1A-43 BARRIO SANTA ISABEL	Carrera 26 A 1A 43		Barrio Santa Isabel					
KR 19B1 9 - 25 LOS CORTIJOS	Carrera 19B1 9 25		Los Cortijos					
CALLE 7 NO 11-24	Calle 7 11 24							
APTO 304 T1 EDIF SIEMPRE VERDE CRA 17 #118-32	Carrera 17 118 32	Apartamento 304		Edificio Siempre Verde				
CRA 42 NO 85 A 95 ITAGUI-ITAGUI-ITAGUI-ANTIOQUIA	Carrera 42 85 A 95					Itagui	Antioquia	
CR 7, 10-87,	Carrera 7 10 87							
CALLE 59 # 56-63, NRO. TORRE 6, APTO. 721	Calle 59 56 . 63	Apartamento. 721						
CALLE69SUR 46A 64 CALLE DEL BANCO TORRE ASÍS II APT 701, S/	Calle69Sur 46A 64	Apartamento 701				Sabaneta	Antioquia	Colombia
MANZANA J5 CASA 11 B. VILLA CATALINA	Manzana J5	Casa 11	Villa Catalina					
CRA91#44A39,AMÉRICA NIZA 2PISO MEDELLÍN BARRIO: AMÉRICA	Cra91 44A39		America Niza			Medellin		
CR 34 # 10 581 ACOPI YIMBO	Carrera 34 10 581			Acopi			Yimbo	
CALLE 22 #1-140 AV BOLIVAR FERRETERIA ARGENTINA	Calle 22 1 140			Ferreteria Argentina				
TR 58 BIS # 2 C 60 B CAMELIA	Transversal 58 Bis 2 C 60		B Camelia					
KILOMETRO 3981 ANIKLO VIAL RIO FRIO ZOBA FRANCA SANTANDE	Kilometro 3981 Anillo Vial Rio Frio			Edificio Baiachara		Santander		
CARRERA 4 #2-03 BARRIO CHAPINERO	Carrera 4 2 03		Barrio Chapinero					
CRA 14F 76B 57 SUR INT 1 MARICHUELA USME BOGOTÁ, D.C. BOG	Carrera 14F 76B Sur 57	Interior 1				Bogota D.C.	Bogota	Col
CR 10 A # 11 75 LOCL 103 PASAGE GOMEZ	Carrera 10 A 11 75	Local 103		Pasage Gomez				
CL 24 # 6 67 CENTRO APTO 301 PEREIRA BARRIO: CENTRO	Calle 24 6 67	Apartamento 301	Pereira Barrio Centro		Centro			
CLL 82 # 67 A -51	Calle 82 67 A 51							
CL 21 # 6 36 CENTRO MONTERÍA CÓRDOBA COL	Calle 21 6 36				Centro	Monteria	Cordoba	Col
CL 71 # 6-21 OF 301HIDROCARBUROS DEL CASANARE S.A.S	Calle 71 6 21			Hidrocarburos Del Casanare S.A.S				
CL 20 A # 12 70 METRO SECCION ELECTRO	Calle 20 A 12 70				Metro Seccion Electro			
CARRERA 22B NUMERO 13A 47 BARRIO GUAYAQUIL BARRIO GUA	Carrera 22B 13A 47		Barrio Guayaquil	Barrio Guayaquil				
CR 1 # 12 -118 CC PLAZA BOCAGRANDE LC 105	Carrera 1 12 118	Local 105		Cc Plaza Bocagrande				

Software for Labelling

Supervisely: www.app.supervise.ly



Platform.ai: www.platform.ai



platform.ai/app/imageTraining/projects/ahJzfnBsYXRmb3JtLWFpLXByb2RyUwsSBFVzZXIiHEd1cTl0QmxwekZTZGYwUE92OEgyN01JSXF1QjMMCxIH...
Car Damage
My labels (13)
Dent
13 images
Major
103 images
None
221 images
beach
57 images
car wheel
26 images
convertible
46 images

PixelAnnotationTool (github)

Working Examples

multilabel.herokuapp.com