UNRAVELLING INSIGHTS ABOUT PROPERTIES AND PLACES WITH COMPUTER VISION

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Founder of beautifulplaces.ai

BEAUTIFUL PLACES ZOOPLA hometrack

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The Ambassadors
Hans Holbein
the Younger
1533


Upside down globe
Lute with a broken string
Protestant hymnal
Math book open to division
Flute with missing pipe


We are just at the cusp of understanding the sheer richness of data that imagery can provide

Using Computer Vision to predict the beauty of places

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Do beautiful environments have a quantifiable association with increased wellbeing?

“Easy” to measure:

- Greenspace
- Distances to parks
- Land cover
- Measures of biodiversity

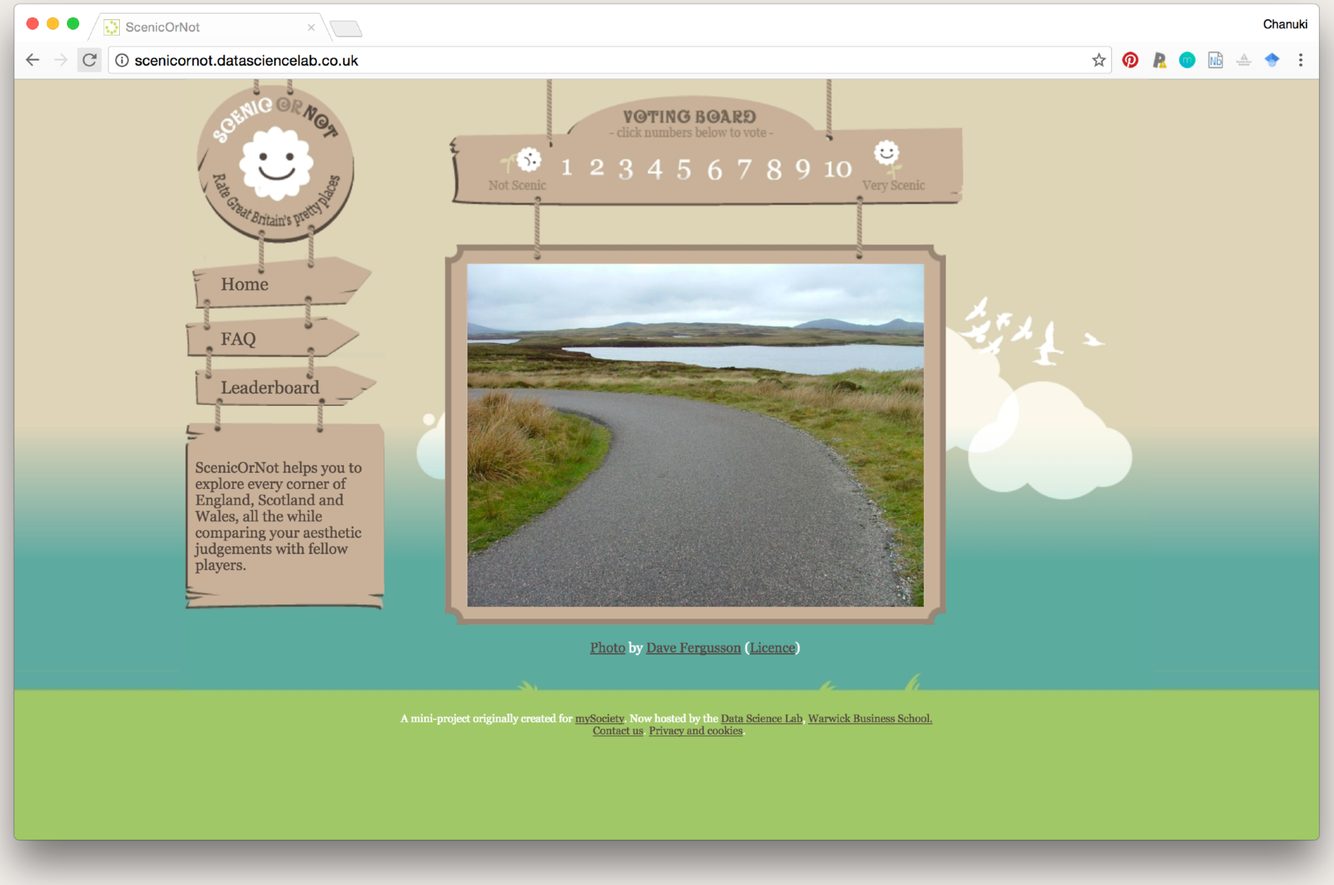
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THINKSTOCK



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Measuring Beauty with AI

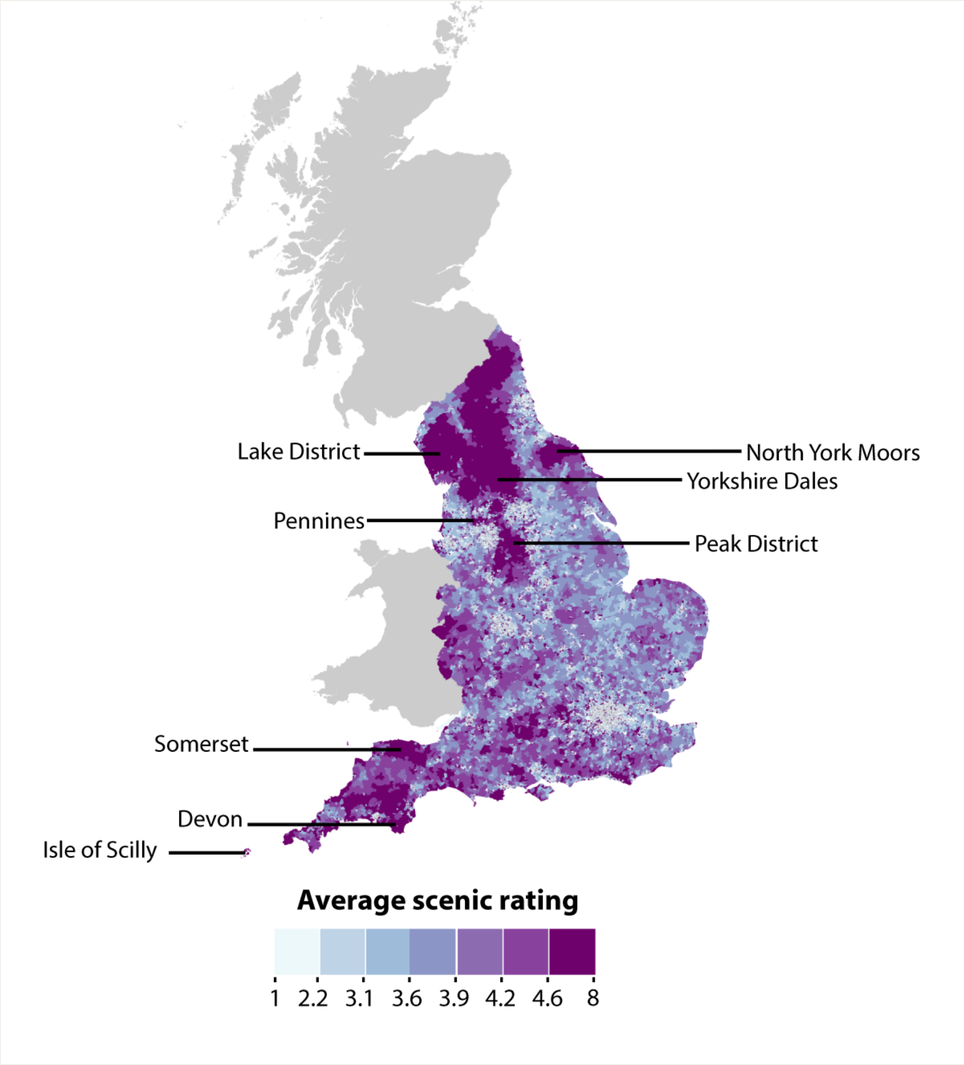


217,000 images
1.5 million votes
1 image per 1 km2

mySociety

geograph
photograph every grid square!

Measuring Beauty with AI



Data Source: Scenic-Or-Not. Contains National Statistics, NISRA, NRS and Ordnance Survey data © Crown copyright and database right 2013.

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We already know
natural environments
are linked to
increased wellbeing

Is there a collective understanding of beauty that goes beyond what is natural is beautiful?

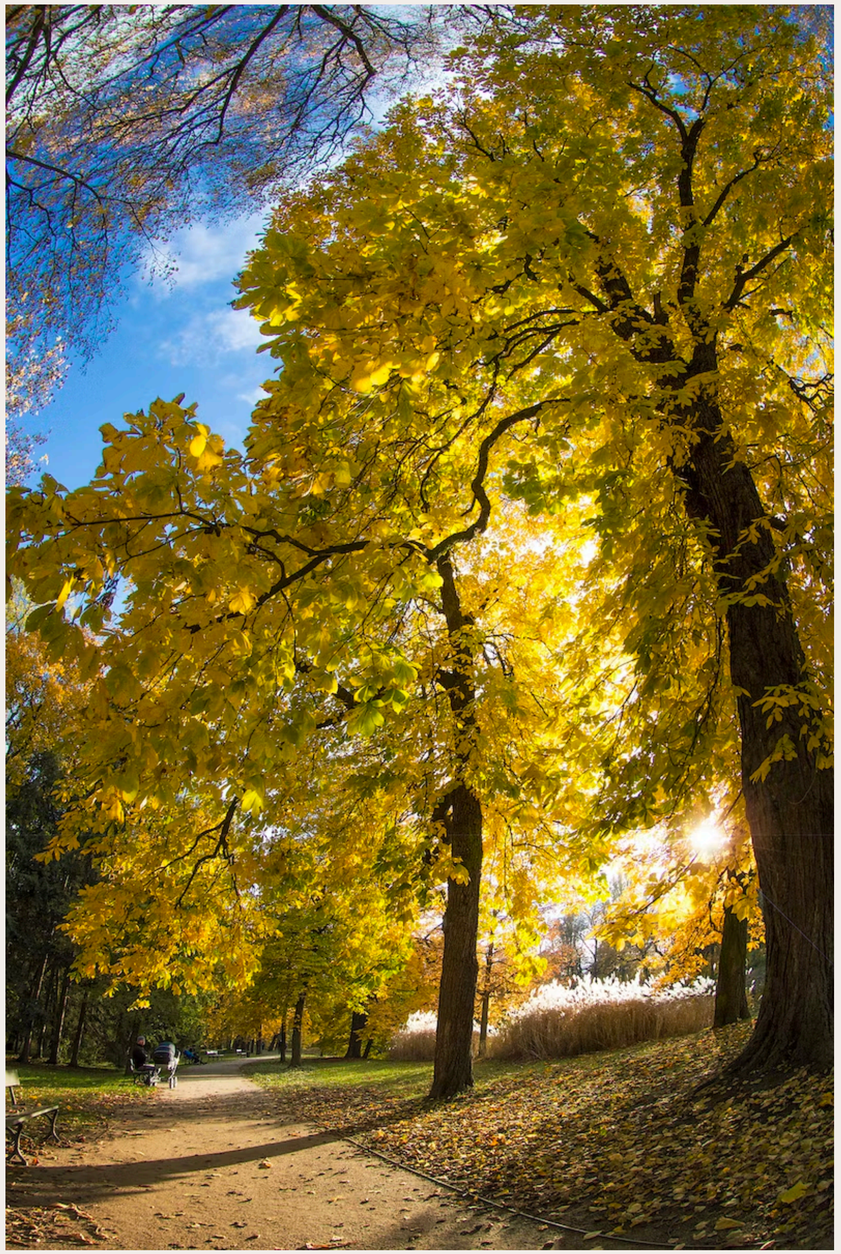
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Kellert and Wilson’s Biophilia hypothesis

We have an innate connection to nature.

We have evolved to find attractive those things that aid survival, such as fruit-bearing or climbable trees.

Kellert, S. R. & E. O. Wilson 1995 The biophilia hypothesis. Island Press.



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Jay Appleton's Prospect and Refuge Theory

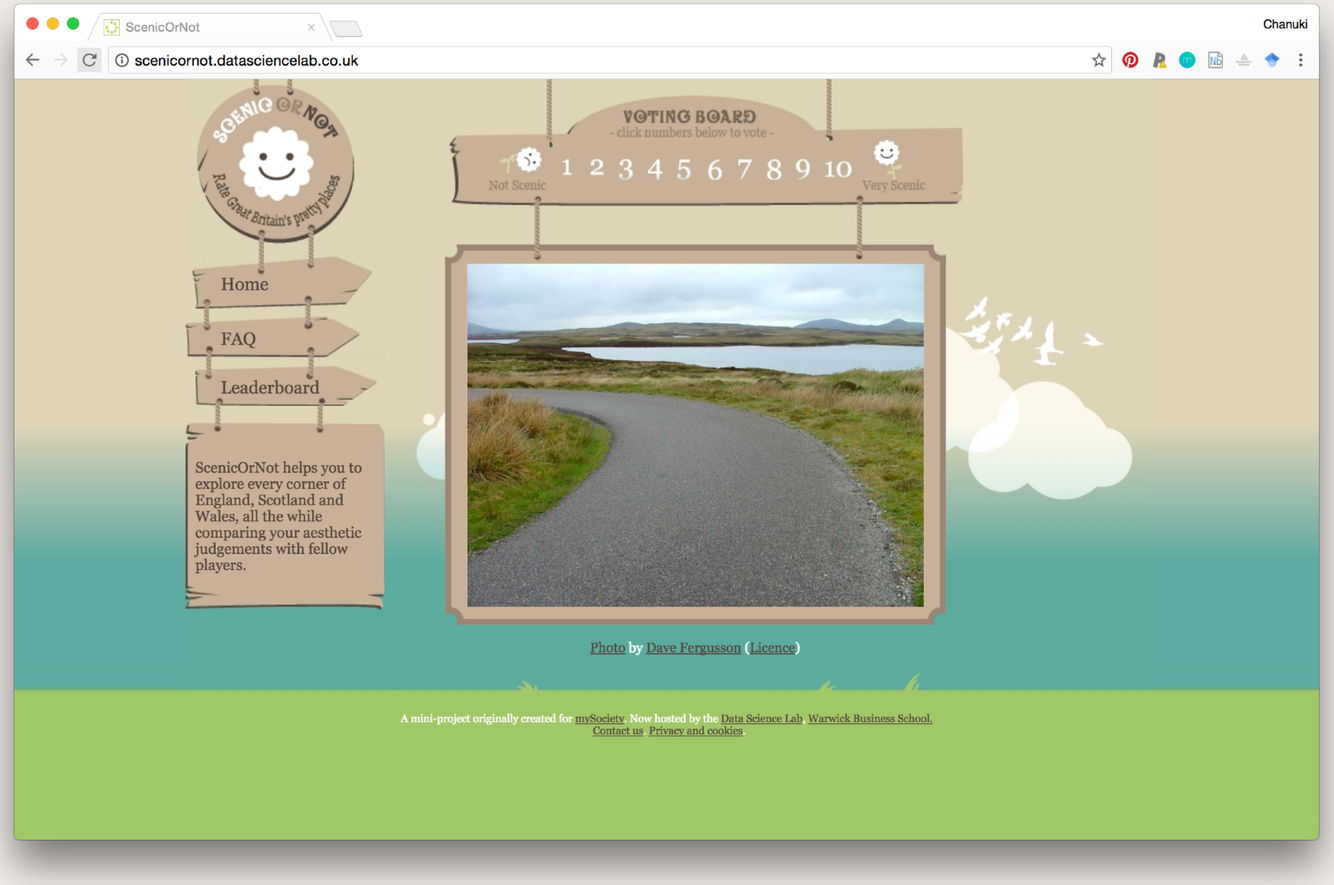
We have evolved to prefer outdoor spaces where one can easily view “prospects” as well as spaces that might contain “refuge” where one can easily hide and avoid potential dangers.

Appleton, J. 1996 The experience of landscape. Wiley Chichester.



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Measuring Beauty with AI

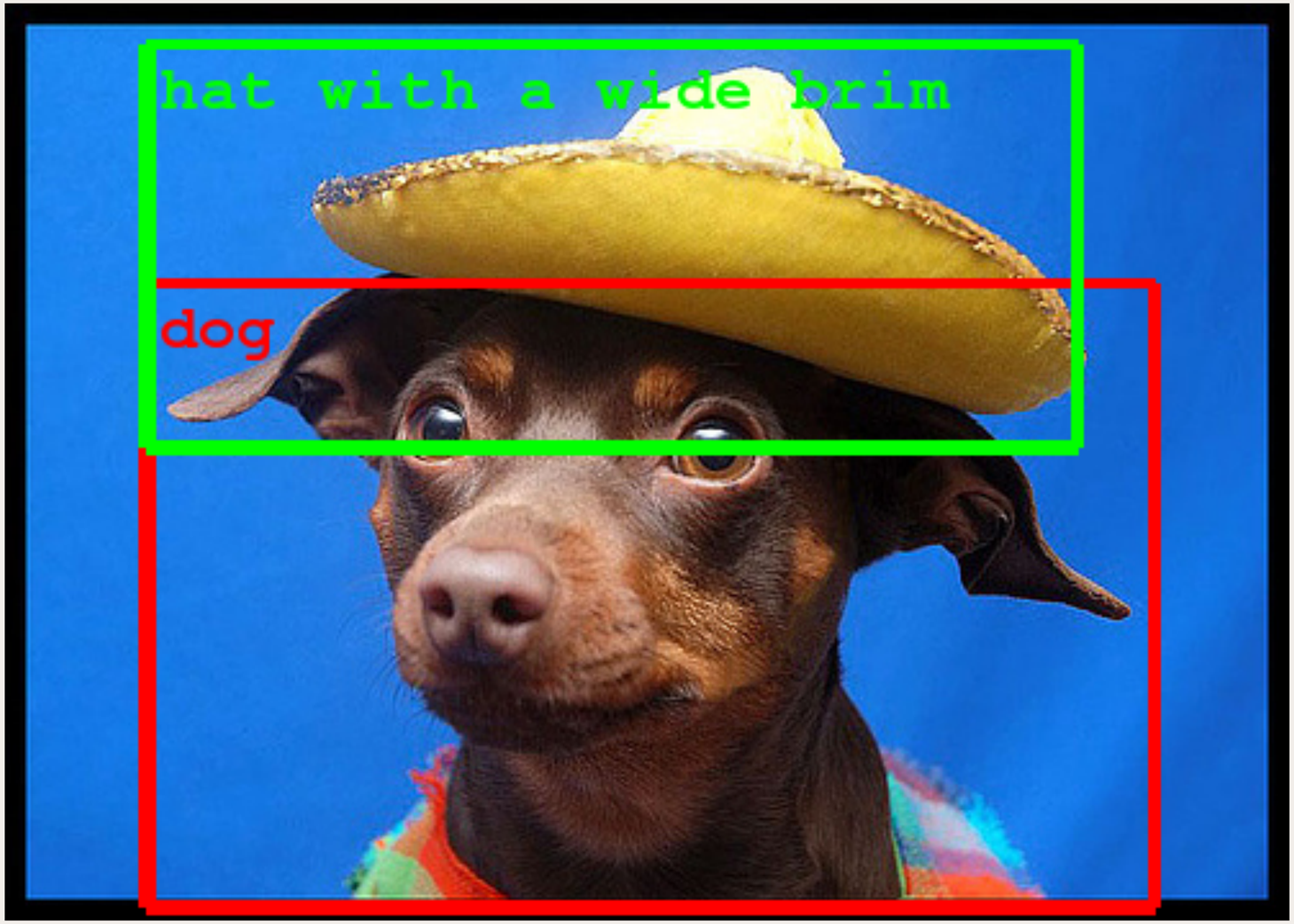


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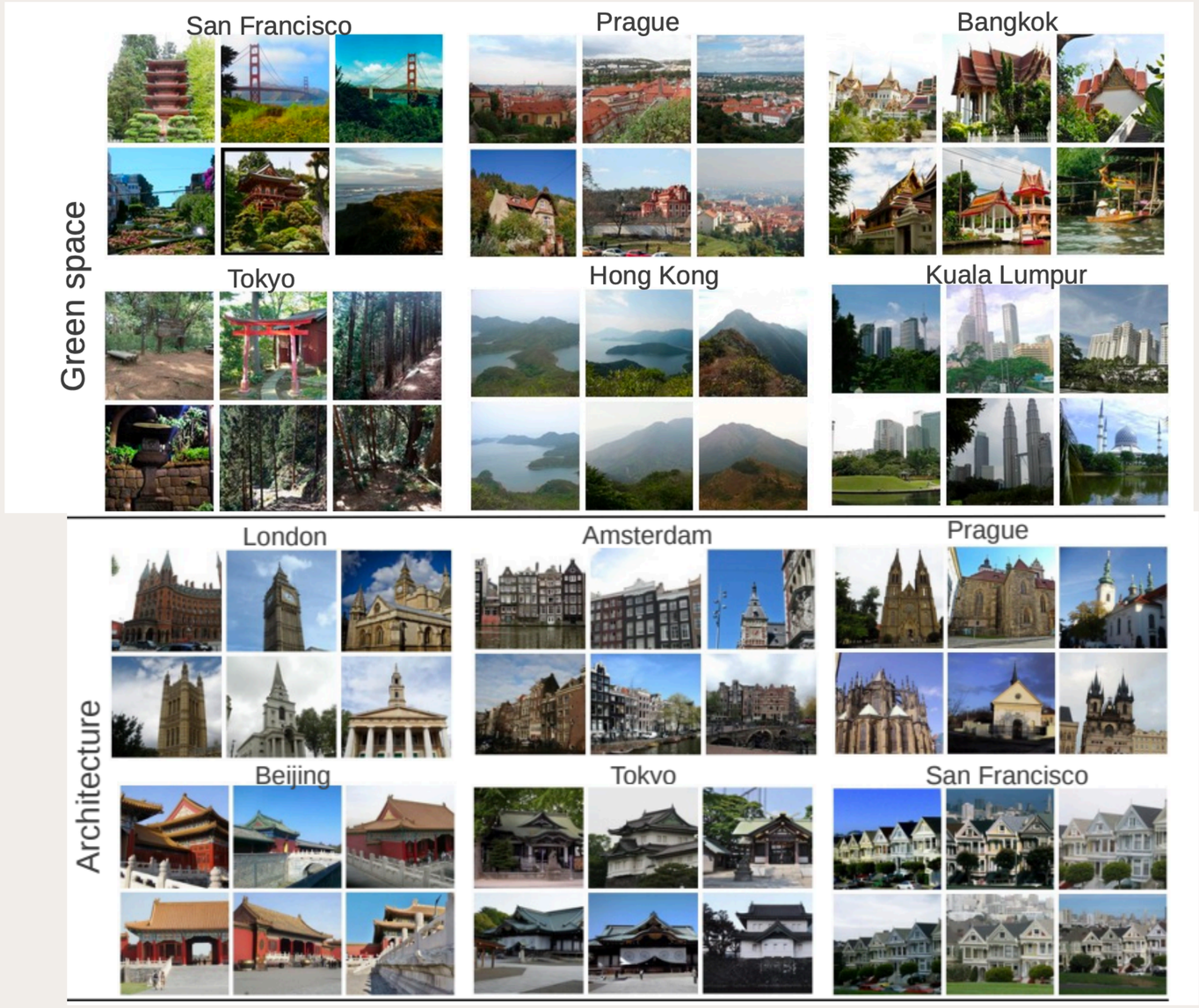
Measuring Beauty with AI



Convolutional neural networks to the rescue...

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Measuring Beauty with AI



2 million images
21 cities
3 continents

Paper: Bolei Zhou, Liu Liu, Aude Oliva and Antonio Torralba, Recognizing City Identity via Attribute Analysis of Geo-tagged Images. Proceedings of 13th European Conference on Computer Vision (ECCV), 2014.

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Measuring Beauty with AI

MIT Places for Scene Recognition



Place categories
skyscraper: 0.60
tower: 0.27
office_building: 0.09

Scene attributes
clouds, openarea, manmade, naturallight, mostlyverticalcomponents, far-awayhorizon, metal, vacationingtouring, wire



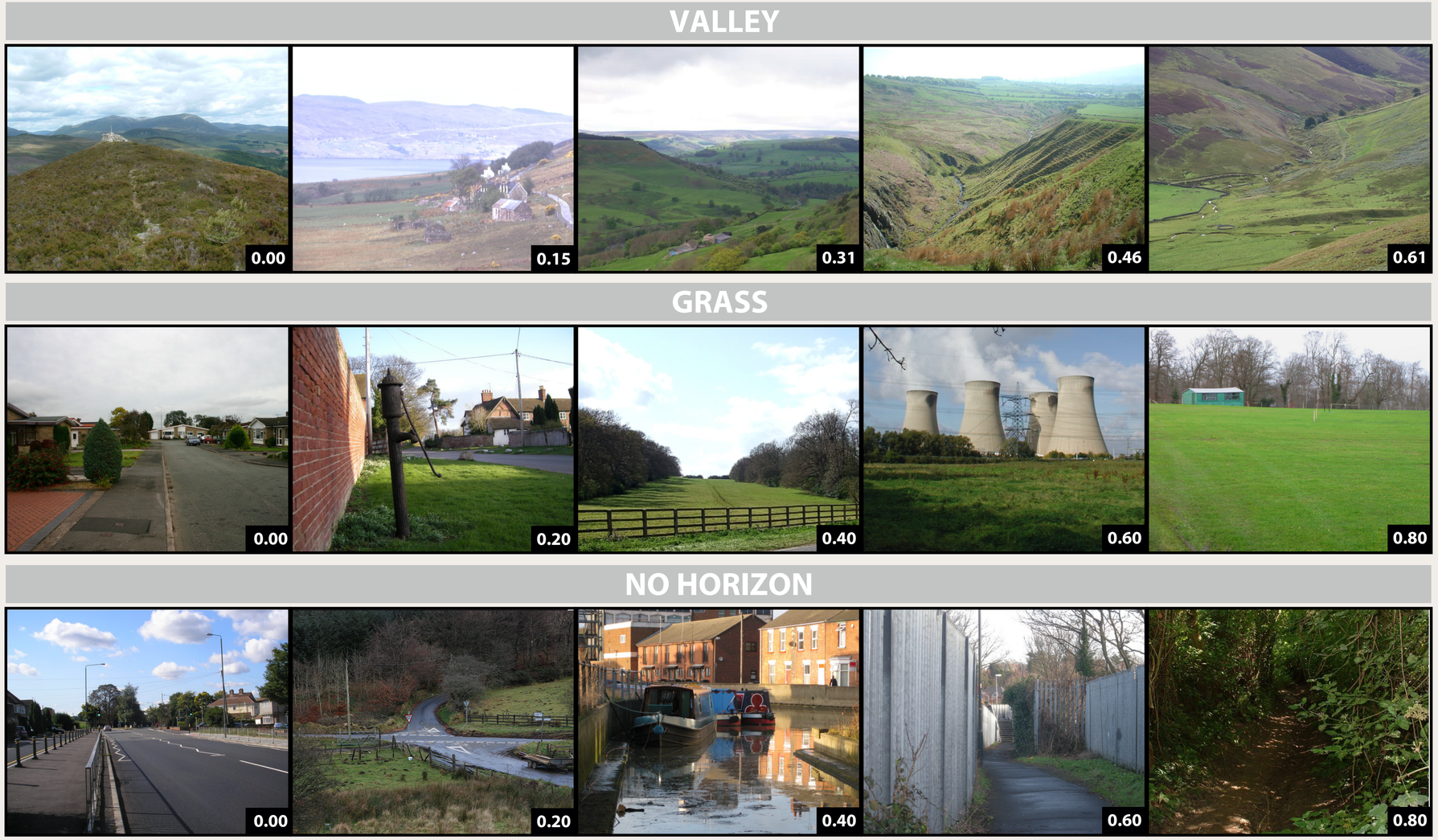
Place categories
coast: 0.35
ocean: 0.30
boardwalk: 0.07

Scene attributes
far-awayhorizon, openarea, naturallight, natural, directsunsunny, swimming, sailingboating, ocean, vegetation, warm

Paper: Bolei Zhou, Agata Lapedriza, Jianxiong Xiao, Antonio Torralba, and Aude Oliva. Learning Deep Features for Scene Recognition using Places Database. Advances in Neural Information Processing Systems 27 (NIPS) spotlight, 2014.

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Measuring Beauty with AI



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Scenic

Coast

Valley
Mountain

Forest
Trees

Scenic







Scenic







Cottage

Lighthouse

Viaduct
Aqueduct

Scenic

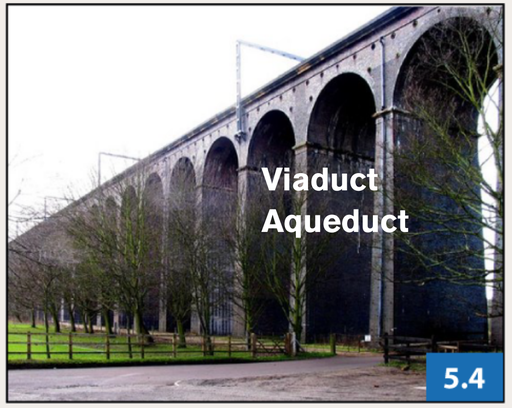












Scenic

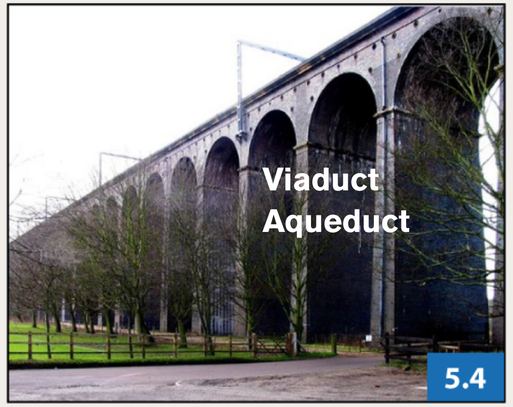












Unscenic

Industrial
Highway

Scenic













Unscenic



Scenic













Unscenic



No Horizon

Scenic













Unscenic





Scenic













Unscenic





Grass

Scenic













Unscenic





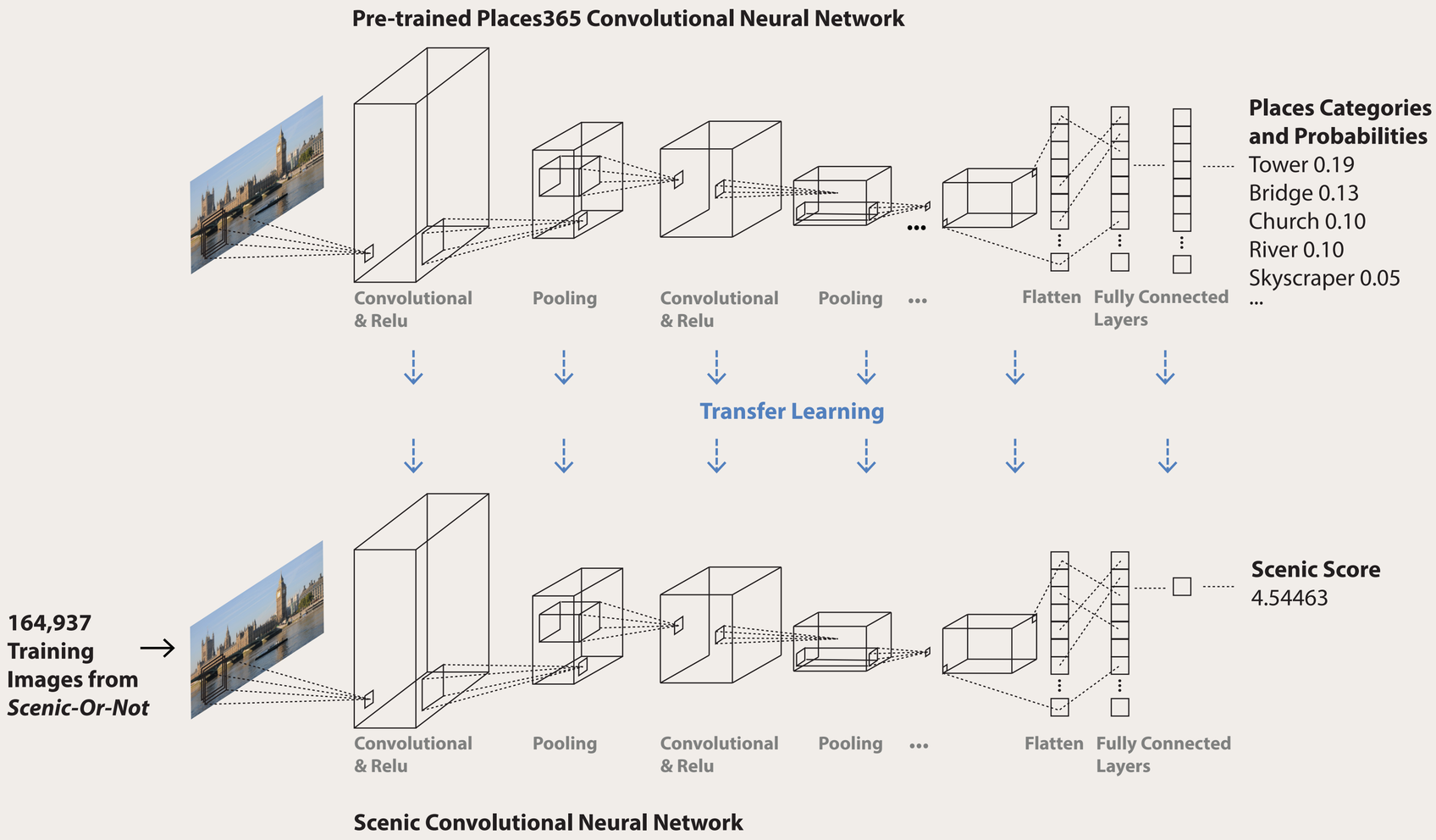



1 image per 1 km²

Can we use a convolutional neural network to help predict the beauty of novel images?

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Measuring Beauty with AI



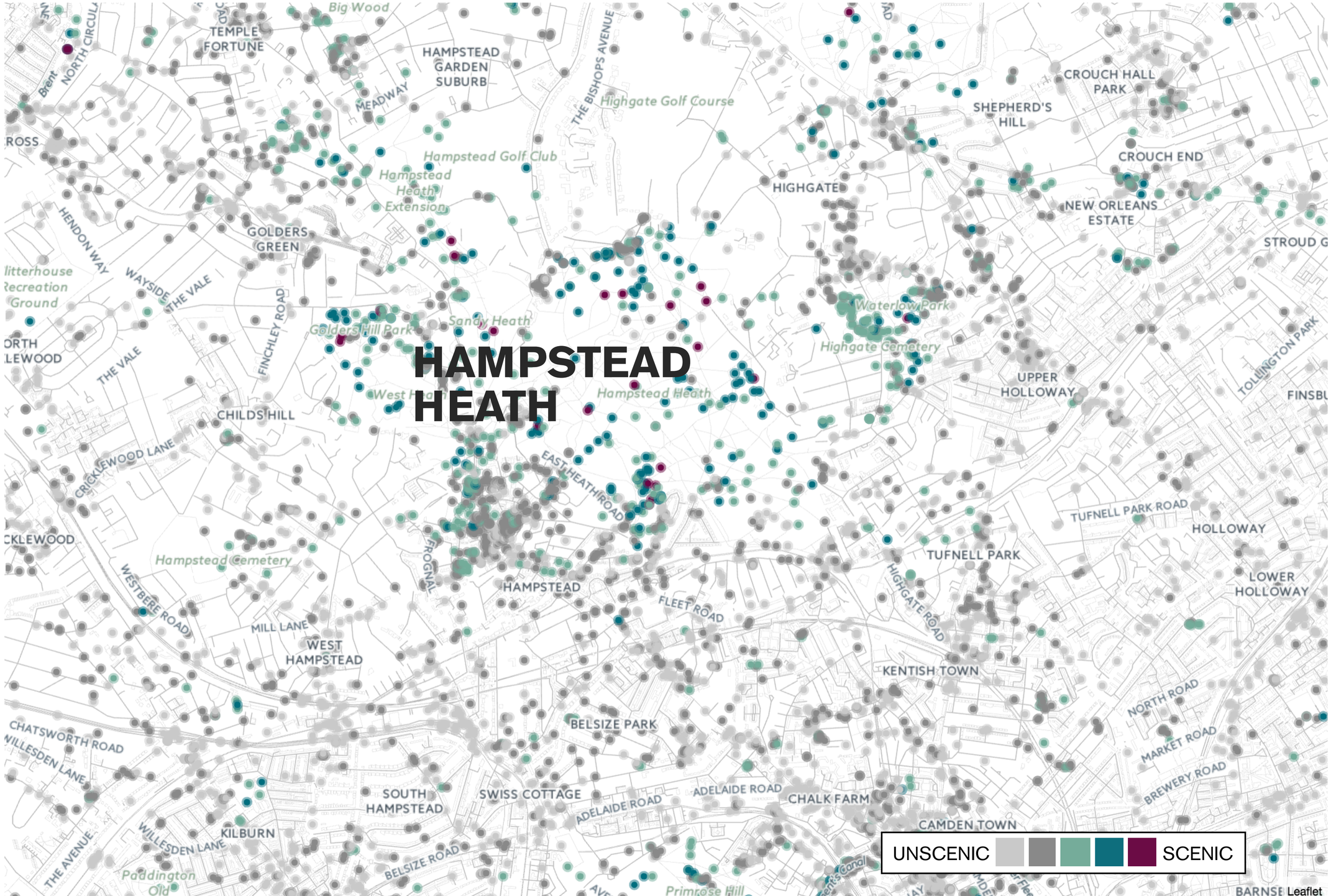
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Measuring Beauty with AI



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HAMPSTEAD HEATH
TEMPLE FORTUNE
HAMPSTEAD GARDEN SUBURB
Big Wood
MEADWAY
THE BISHOPS AVENUE
Highgate Golf Course
CROUCH HALL PARK
SHEPHERD'S HILL
CROUCH END
Hampstead Golf Club
Hampstead Heath Extension
HIGHGATE
NEW ORLEANS ESTATE
GOLDERS GREEN
HENDON WAY
WAYSIDE
THE VALE
FINCHLEY ROAD
Golders Hill Park
Sandy Heath
Waterlow Park
Highgate Cemetery
UPPER HOLLOWAY
TOLLINGTON PARK
CHILDS HILL
Hampstead Heath
CRICKLEWOOD LANE
EAST HEATH ROAD
TUFNELL PARK ROAD
HOLLOWAY
Hampstead Cemetery
FROGNAL
TUFNELL PARK
HIGHGATE ROAD
LOWER HOLLOWAY
WESTBERE ROAD
HAMPSTEAD
FLEET ROAD
MILL LANE
WEST HAMPSTEAD
KENTISH TOWN
NORTH ROAD
CHATSWORTH ROAD
BELSIZE PARK
MARKET ROAD
BREWERY ROAD
WILLESDEN LANE
SOUTH HAMPSTEAD
SWISS COTTAGE
ADELAIDE ROAD
CHALK FARM
CAMDEN TOWN
KILBURN
BELSIZE ROAD
Paddington Old
Primrose Hill
Leaflet


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SWISS COTTAGE
ADELAIDE ROAD
CHALK FARM
CAMDEN TOWN
KILBURN
WILLESDEN LANE
THE AVENUE
BELSIZE ROAD
Paddington Old
Primrose Hill
UNSCENIC
SCENIC
Leaflet

0.255 Lake Natural
0.236 Swimming Hole
0.096 River

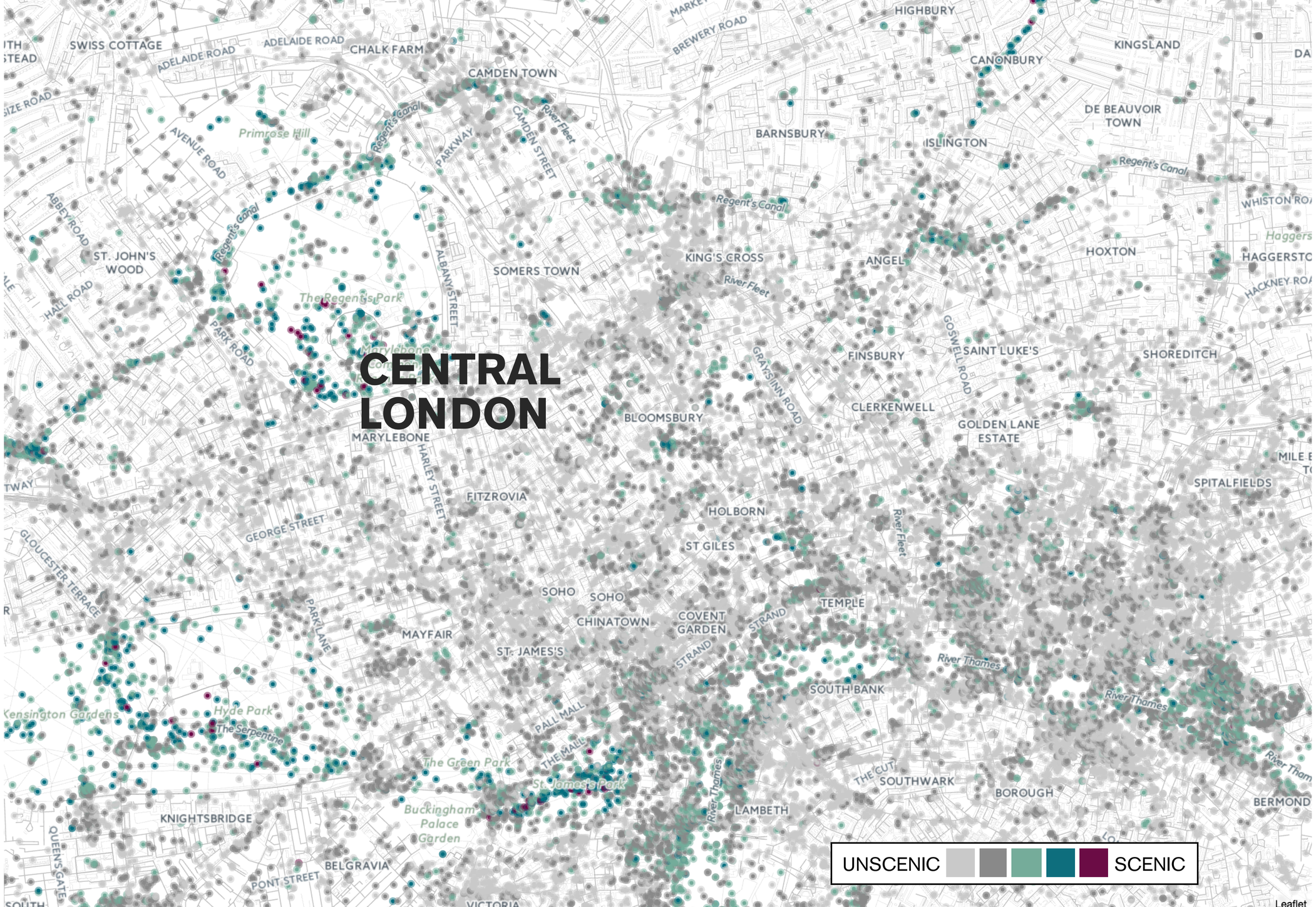
0.997 Swimming
0.002 Sailing/Boating
0.001 Still water

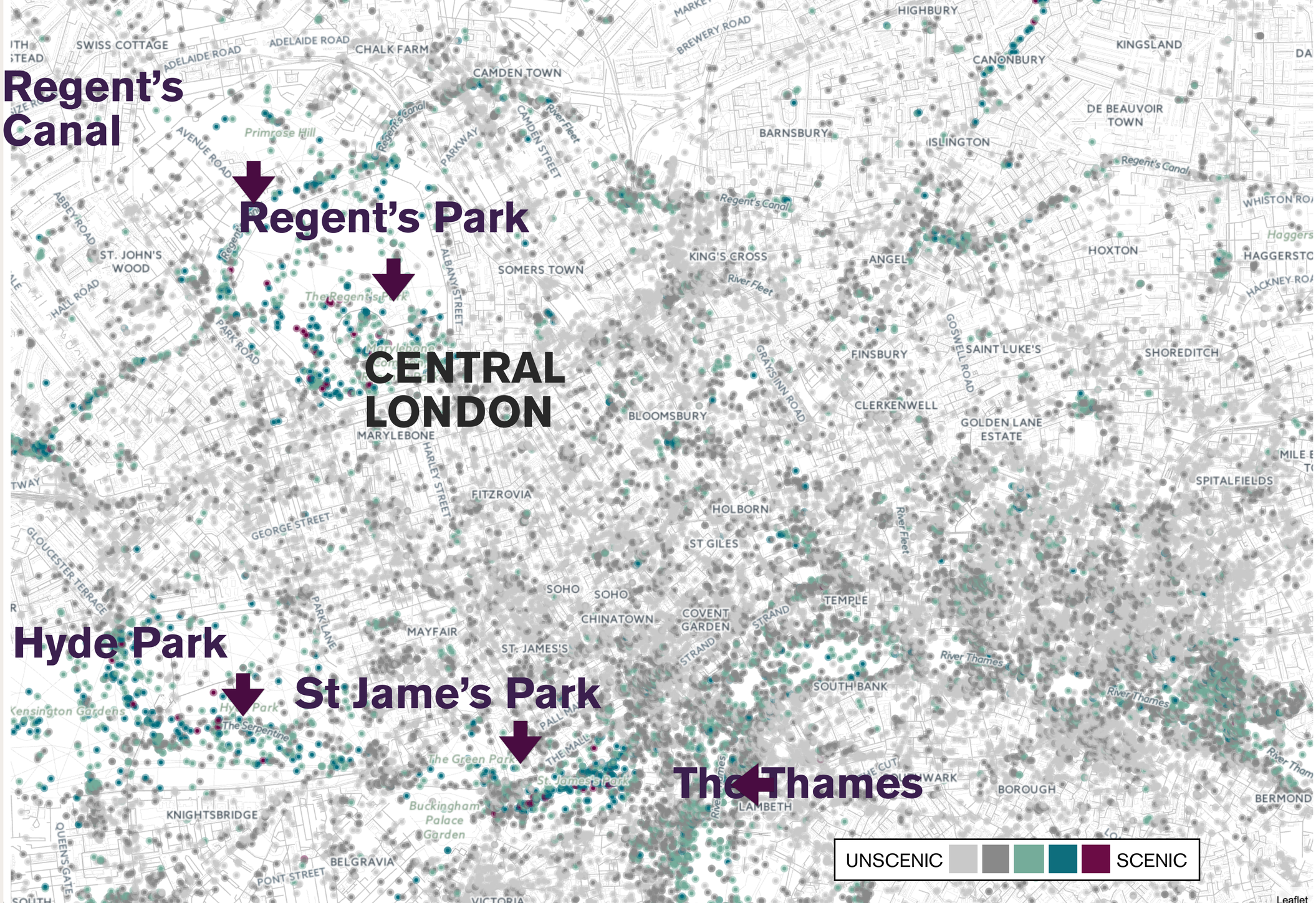


Hampstead Heath Ponds

UNSCENIC SCENIC

Leaflet


CENTRAL LONDON
UNSCENIC
SCENIC
SWISS COTTAGE
ADELAIDE ROAD
CHALK FARM
CAMDEN TOWN
BREWERY ROAD
HIGHBURY
KINGSLAND
CANONBURY
DE BEAUVOIR TOWN
BARNSBURY
ISLINGTON
Primrose Hill
Regent's Canal
River Fleet
CAMDEN STREET
PARKWAY
AVENUE ROAD
ABBEY ROAD
ST. JOHN'S WOOD
ALBANY STREET
SOMERS TOWN
KING'S CROSS
ANGEL
HOXTON
HAGGERSTON
The Regent's Park
PARK ROAD
Marylebone
FINSBURY
SAINT LUKE'S
SHOREDITCH
GOSWELL ROAD
GRAY'S INN ROAD
CLERKENWELL
BLOOMSBURY
GOLDEN LANE ESTATE
MARYLEBONE
HARLEY STREET
FITZROVIA
SPITALFIELDS
HOLBORN
GEORGE STREET
ST GILES
GLOUCESTER TERRACE
SOHO
TEMPLE
CHINATOWN
COVENT GARDEN
STRAND
MAYFAIR
PARK LANE
ST. JAMES'S
River Thames
SOUTH BANK
Kensington Gardens
Hyde Park
The Serpentine
PALL MALL
THE MALL
The Green Park
St. James's Park
THE CUT
SOUTHWARK
BOROUGH
BERMONDSEY
Buckingham Palace Garden
KNIGHTSBRIDGE
LAMBETH
QUEEN'S GATE
BELGRAVIA
PONT STREET
Leaflet


Regent's Canal
Regent's Park
CENTRAL LONDON
Hyde Park
St Jame's Park
The Thames
UNSCENIC
SCENIC
Leaflet



0.297 Raceway
0.186 Highway
0.15 Industrial Area

0.813 Grass
0.164 Natural Light
0.017 Open Area

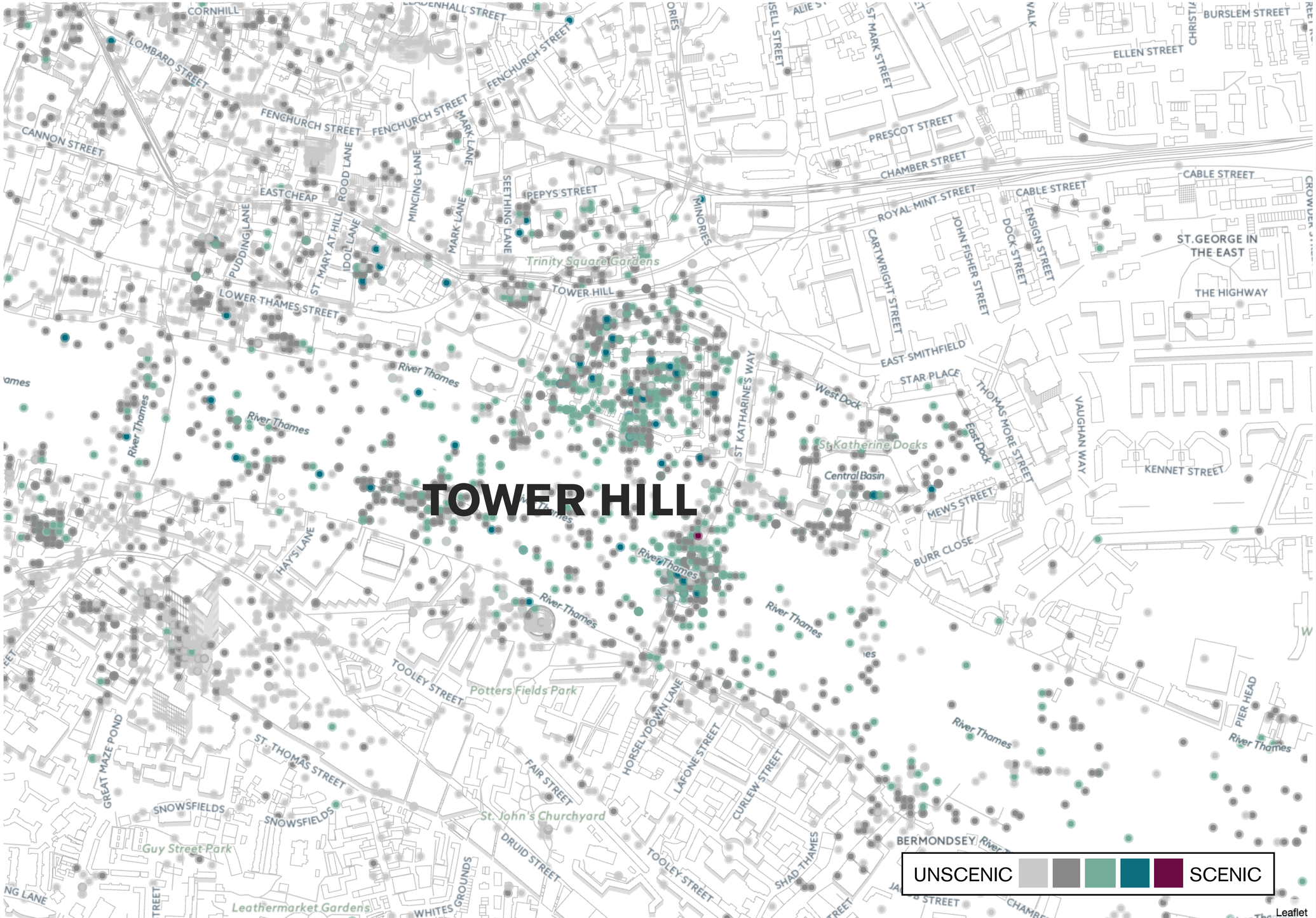


0.350 Parking Lot
0.098 Picnic Area
0.086 Park

0.828 Trees
0.042 Leaves
0.037 Open Area

UNSCENIC SCENIC

Leaflet


TOWER HILL
UNSCENIC
SCENIC
Leaflet
CORNHILL
LOMBARD STREET
FENCHURCH STREET
CANNON STREET
EAST CHEAP
ROOD LANE
MINCING LANE
MARK LANE
SEETHING LANE
PEPYS STREET
MINORIES
PUDDING LANE
ST. MARY AT HILL
IDOL LANE
Trinity Square Gardens
TOWER HILL
LOWER THAMES STREET
River Thames
HAY'S LANE
TOOLEY STREET
Potters Fields Park
GREAT MAZE POND
ST. THOMAS STREET
SNOWSFIELDS
Guy Street Park
FAIR STREET
St. John's Churchyard
DRUID STREET
Leathermarket Gardens
WHITES GROUNDS
HORSELYDOWN LANE
LAFONE STREET
CURLEW STREET
TOOLEY STREET
SHAD THAMES
BERMONDSEY
PRESCOT STREET
CHAMBER STREET
ROYAL MINT STREET
CABLE STREET
ST.GEORGE IN THE EAST
THE HIGHWAY
CARTWRIGHT STREET
JOHN FISHER STREET
DOCK STREET
ENSIGN STREET
EAST SMITHFIELD
STAR PLACE
ST KATHARINE'S WAY
West Dock
St Katherine Docks
Central Basin
East Dock
THOMAS MORE STREET
VAUGHAN WAY
KENNET STREET
MEWS STREET
BURR CLOSE
PIER HEAD
ELLEN STREET
BURSLEM STREET
ST MARK STREET

0.501 Castle
0.103 Palace
0.099 Moat Water

0.997 Man Made
0.002 Open Area
0.001 Natural Light



Tower of London

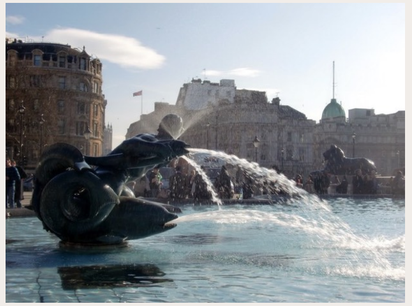
UNSCENIC SCENIC

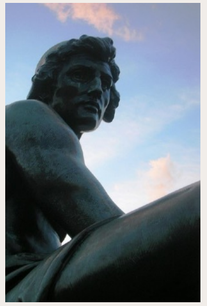
Leaflet

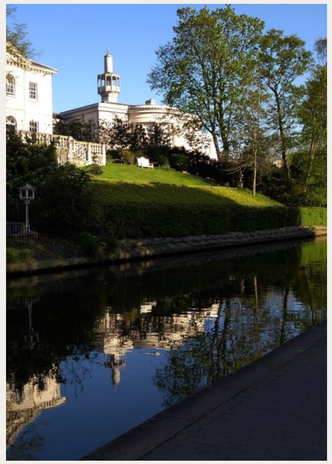
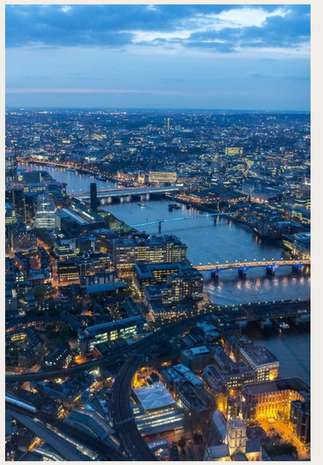
Measuring Beauty with AI

A sample of the top 5% predicted scenic images in London






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Measuring Beauty with AI



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Research

Cite this article: Seresinhe CI, Preis T, Moat HS. 2017 Using deep learning to quantify the beauty of outdoor places. *R. Soc. open sci.* **4**: 170170.
http://dx.doi.org/10.1098/rsos.170170

Received: 23 February 2017
Accepted: 19 June 2017

Subject Category:
Computer science

Subject Areas:
environmental science/computer modelling and simulation

Using deep learning to quantify the beauty of outdoor places

Chanuki Illushka Seresinhe[1,2], Tobias Preis[1,2] and Helen Susannah Moat[1,2]

[1]Data Science Lab, Behavioural Science, Warwick Business School, University of Warwick, Coventry CV4 7AL, UK
[2]The Alan Turing Institute, British Library, 96 Euston Road, London NW1 2DB, UK

CIS, 0000-0001-6599-1325; TP, 0000-0001-9185-0892; HSM, 0000-0001-8974-9277

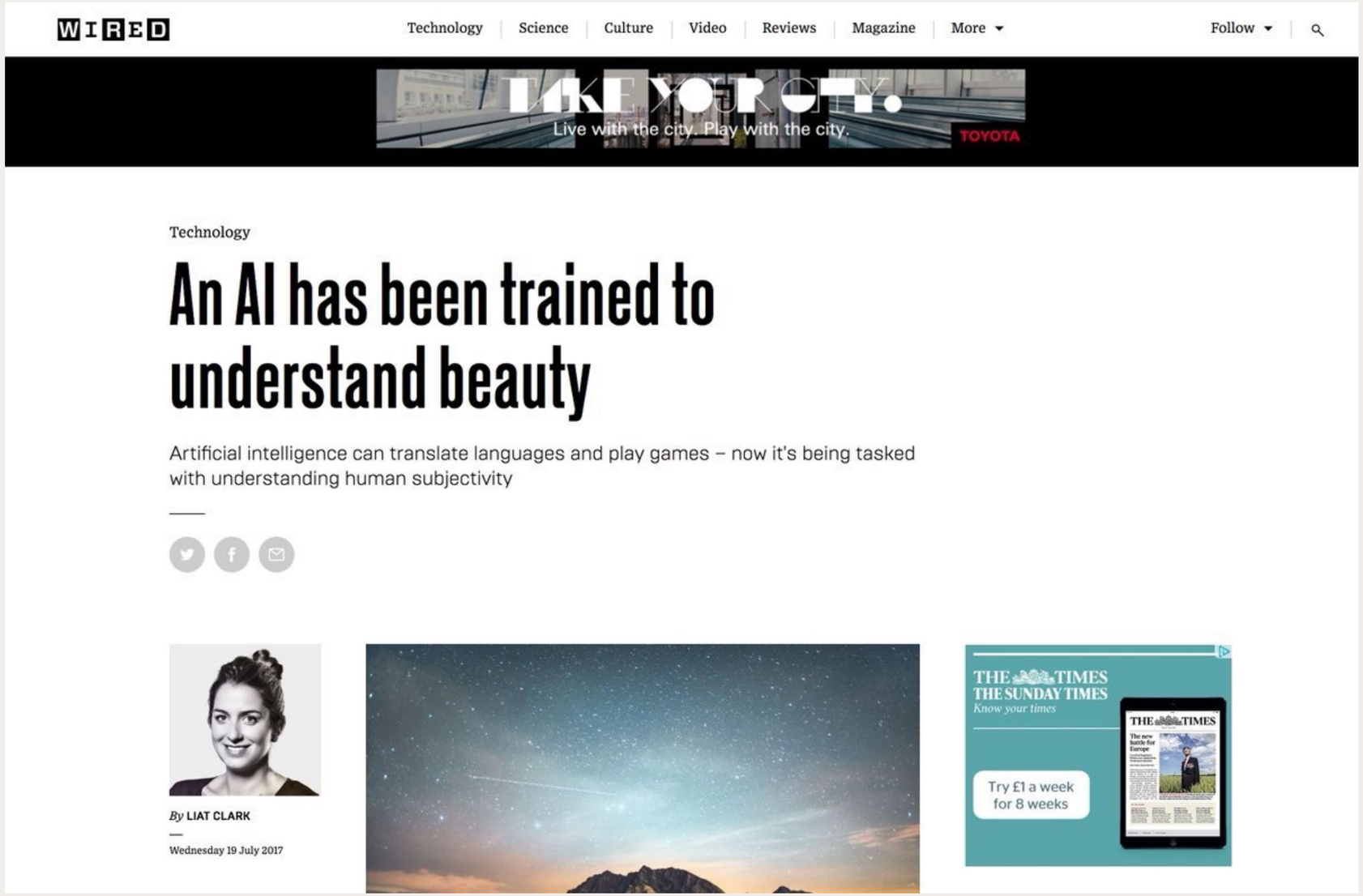
Beautiful outdoor locations are protected by governments and have recently been shown to be associated with better health. But what makes an outdoor space beautiful? Does a beautiful outdoor location differ from an outdoor location that is simply natural? Here, we explore whether ratings of over 200 000 images of Great Britain from the online game *Scenic-Or-Not*, combined with hundreds of image features extracted using the Places Convolutional Neural Network, might help us understand what beautiful outdoor spaces are composed of. We discover that, as well as natural features such as 'Coast', 'Mountain' and 'Canal Natural', man-made structures such as 'Tower', 'Castle' and 'Viaduct' lead to places being considered more scenic. Importantly, while scenes containing 'Trees' tend

Our findings demonstrate how online data combined with neural networks can provide a deeper understanding of what environments we might find beautiful, and offer quantitative insights for policymakers charged with the design and protection of our built and natural environments.

Seresinhe, C. I., Preis, T., & Moat, H. S. (2017) Royal Society Open Science, 4(7), 170170.

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Measuring Beauty with AI



Extracting insights about properties using Computer Vision

Houseful

Houseful

Software

alto

JUPIX complete property platform

yourkeys

Data & Risk

hometrack

CALCASA®

Homes

ZOOPLA

Mojo

PrimeLocation

ZOOPLA

My Home | Saved | My Zoopla

For sale | To rent | House prices | New homes | News and guides | Find agents

Currently off-market This property is not for rent or sale on Zoopla.

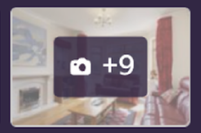
MY HOME HOMEOWNER

Connaught Gardens, London,

5 beds 3 baths 5 receptions

Freehold Detached house



Tracking

I'm the homeowner



Property estimate | Rental estimate

Estimated price

£2.28m Low — **£2,401,000** — £2.52m High

High confidence

+£151,000 (7%)

Since last sold - November 2020

How we calculate and rate our estimates ›

Automated Valuation Model (AVM)

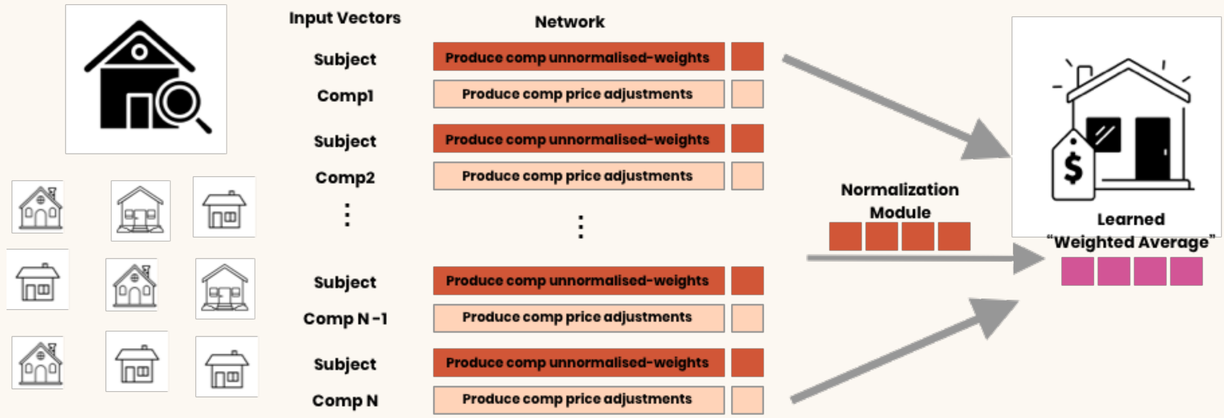
Our AVM is the UK's industry-leading valuation model. It generates accurate, instant property valuations to drive confident lending decisions.

Our AVM gives lenders lower costs and faster time to yes, with no additional risk.



Automated Valuation Model (AVM)

Comparables-based approach valuing a property based on known valuations in the neighbourhood



Data taken into account include:

- Previous sale prices and dates of the property
- Changes in market value of similar properties sold nearby; value trends
- Characteristics of the property, e.g. number of bedrooms

ZOOPLA

My Home Saved My Zoopla

For sale To rent House prices New hom

Currently off-market This property is

MY HOME HOMEOWNER

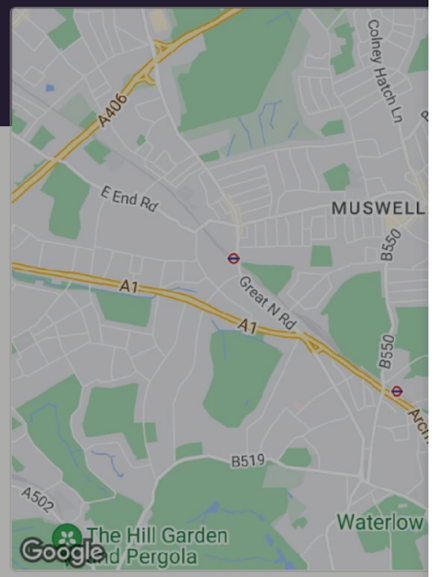
Connaught Garde

5 beds 3 baths 5 rece

Freehold Detached house







Tracking

I'm the homeowner

te

price

,000 £2.52m

High

dence

0 (7%)

ovember 2020

ate our estimates ›

How we calculate and rate our estimates

We update our estimates every month based on the info we get from regulated data sources. Our computer algorithm then generates an estimate based on your home and similar properties nearby. Magic.

We include:

- ✓ Official survey records from accredited surveyors
- ✓ Sold house price data from HM Land Registry and Registers of Scotland
- ✓ Energy performance certificates (EPCs)
- ✓ Live for sale and to rent property listings
- ✓ Address data from Royal Mail and Ordnance Survey

We do not include:

- ✗ Renovations and makeovers
- ✗ Recent extensions and extra rooms

For more information on our estimates, see our FAQs.

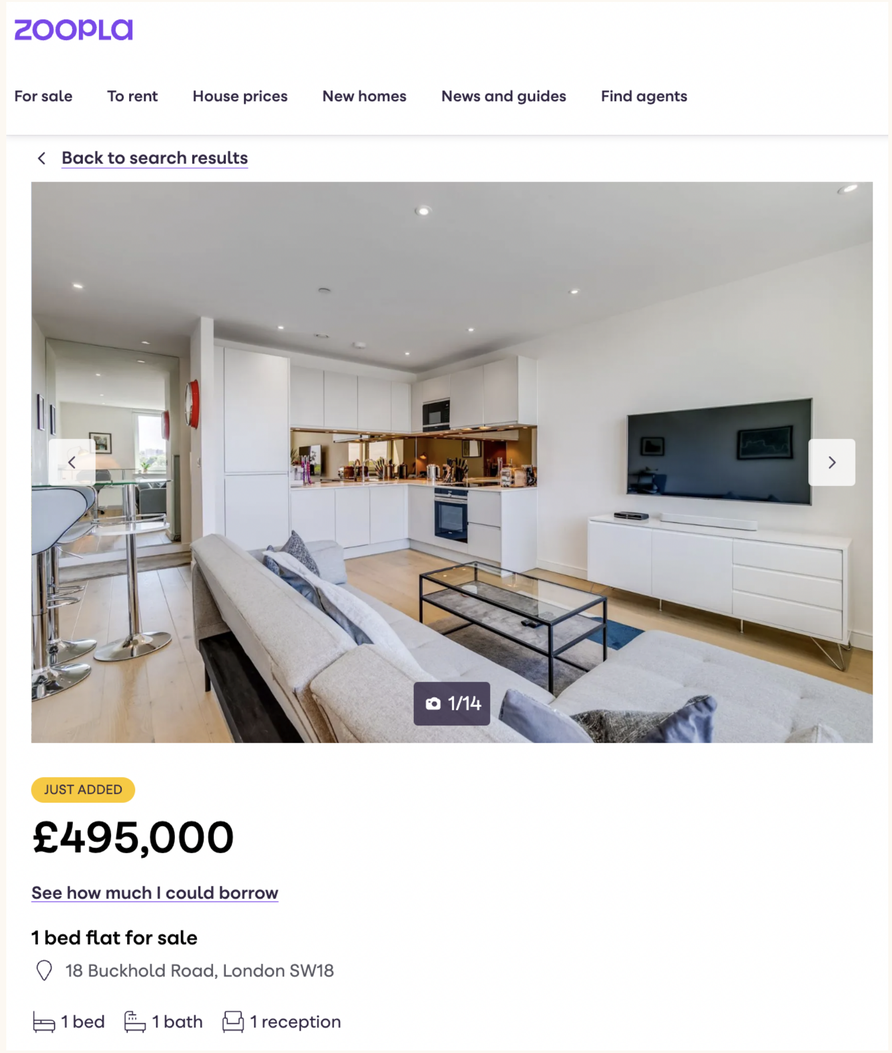
Our confidence ratings

HIGH CONFIDENCE

There are a lot of homes like this in the area. The data is up to date and market conditions are steady. This is a common property in the area.

LOW CONFIDENCE

Our Data



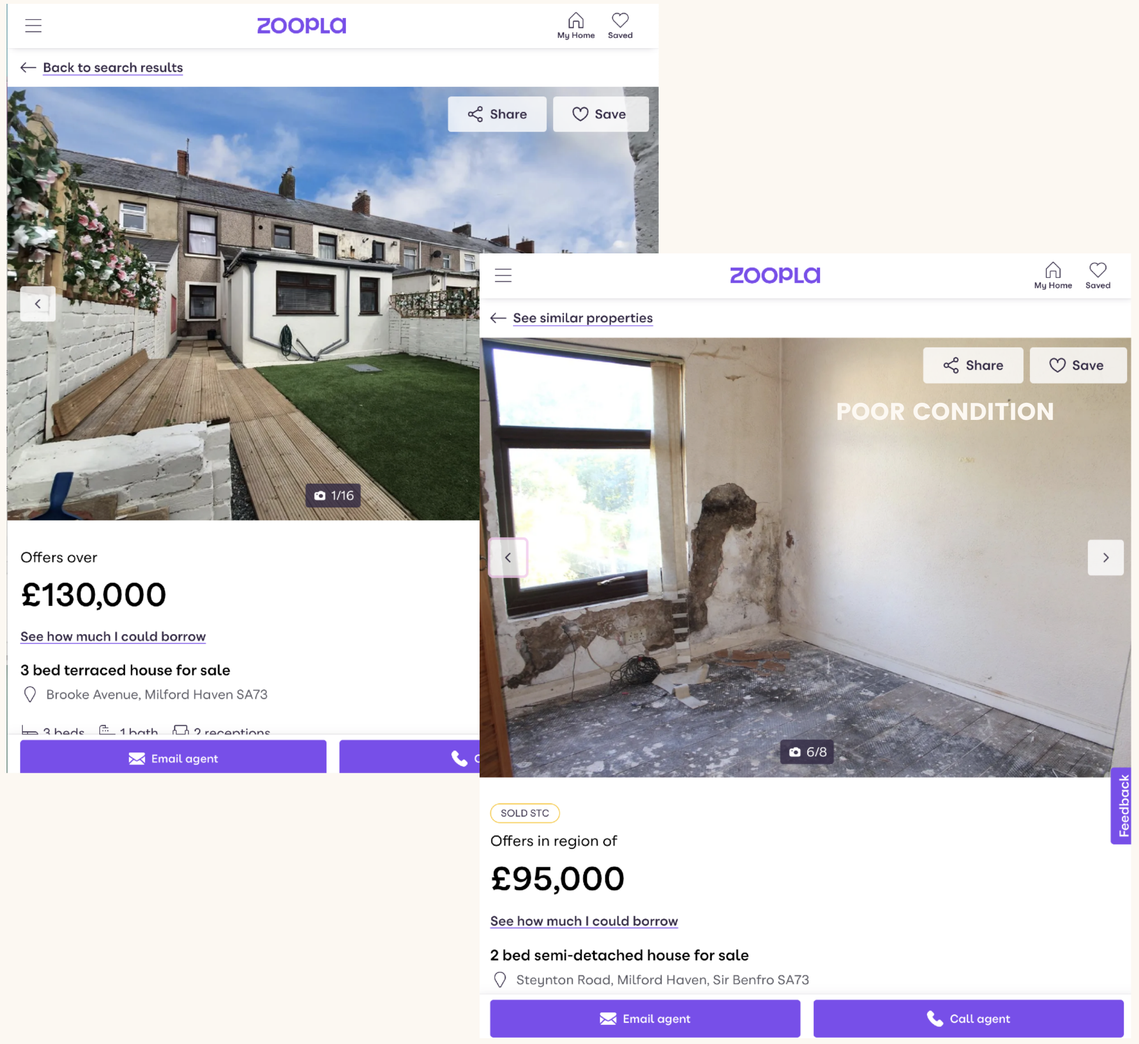
~3 million listings per year

Avg. 14 images per listing

Also: description of images, listing descriptions, surveyor reports...

Poor Condition Modelling

- Determining the quality and condition of a home is normally quite challenging with the data readily available to AVMs
- Being able to leverage **Zoopla Listings** data can help us identify whether or not a **property is in poor condition**
- **Data that can be extracted from imagery and listings text** could also help open up a host of new opportunities for identifying property risks e.g. HMOs, property types including prefabricated houses



Poor Condition Modelling

Example Images













Poor Condition Modelling

Modelling approach



Poor

CV Model

.95 Poor
.05 Good



Poor

CV Model

.80 Poor
.20 Good



Average

CV Model

.30 Poor
.70 Good

AGGREGATOR

.77 Poor
.19 Avg
.04 Good

Actual Label: Poor Condition (extracted from survey data)

Listing Description

NLP Model

.85 Poor
.11 Avg
.04 Good

Property data

Meta Data Model

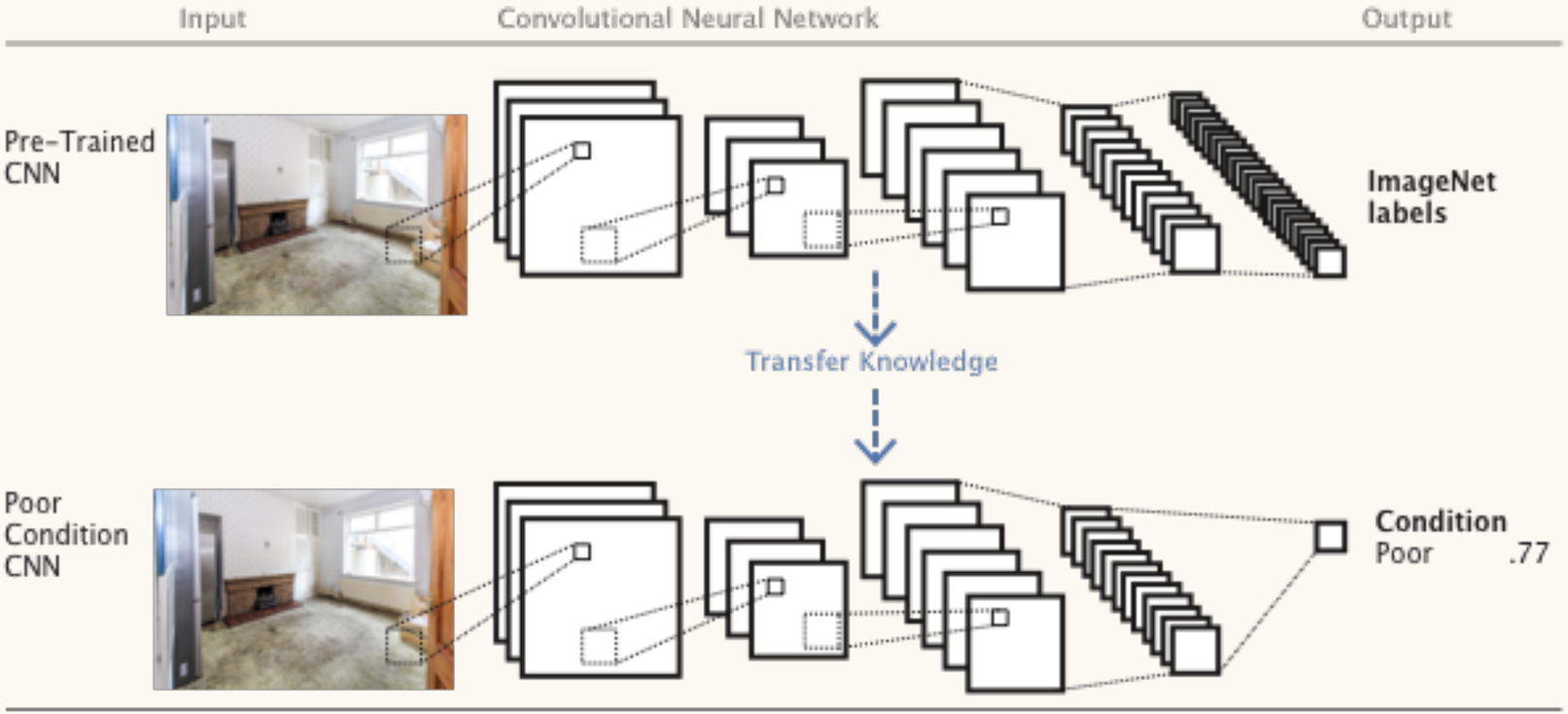
.60 Poor
.20 Avg
.10 Good

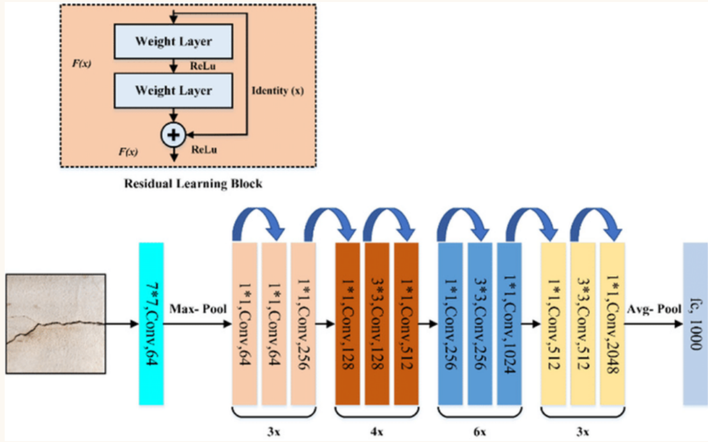
Final Model

Predicted Label Poor Condition 0.85

Poor Condition Modelling
Convolutional Neural Networks

- A Convolutional Neural Network can be trained to identify these poor condition images





Trained using Tensorflow with transfer learning on ImageNet ResNet50 to teach the model to detect images in poor condition.

Computer Vision Model

An initial exploration of the images attached to listings that surveyors have marked as poor indicate that a Convolutional Neural Network could be trained to identify these poor condition images.

52% poor





93% poor

76% poor



NLP Model
Example Property Descriptions

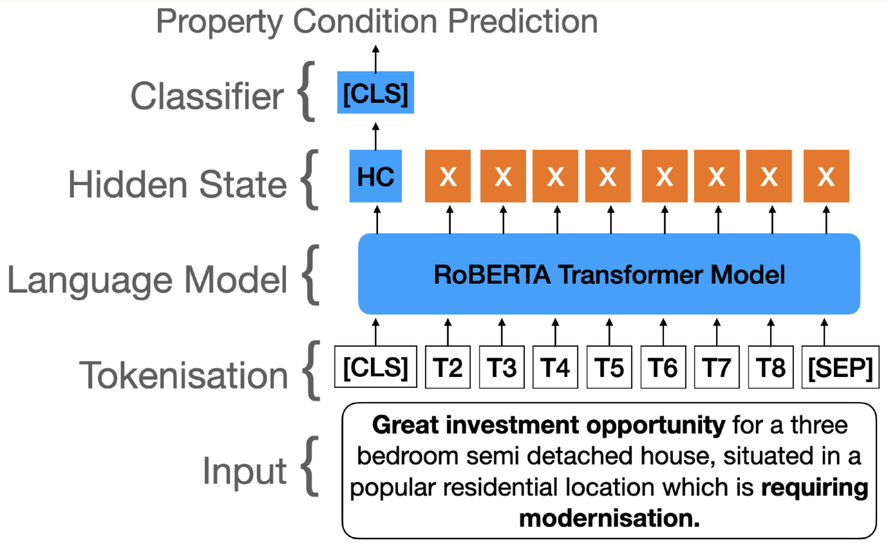
****investment opportunity***large detached annex****no chain**** This is a truly rare opportunity and must be viewed to appreciate the accommodation on offer!This property **requires full refurbishment.** This end-terraced property offers some original period features and has quirky features. Situated in the popular part of High Spen, Rowlands Gill.The property comprises of entrance hallway, sweeping staircase and two large reception rooms and a kitchen. To the first floor, there are two large double bedrooms and a single

Situated on a popular residential turning is this three bedroom terraced family home **requiring modernisation.**The property opens into a long entrance hall leading to two separate reception rooms with the rear allowing access to the rear gardens and is completed by having a fitted kitchen.The first floor benefits three well proportioned bedrooms with the master having a box bay window.Externally is a rear garden that measures over 118 ft and is south facing. To the front of the property is a driveway.Within a short

Move Residential is pleased to offer for sale this larger style four bedroom mid terrace property, located on Ashbourne Road in the popular residential area of Aigburth, L17. Although the property **is in need of some modernisation throughout,** is offers a **profusion of potential** and is waiting ready for a lucky buyer to move in and put their own personal stamp upon - creating their perfect future family home. In brief, the property comprises; an entrance hallway, a bay fronted family lounge with wonderfully high and decorative

NLP Model
BERT vs Logistic Regression w/ TF-IDF

- Estate agents may not always include accurate images of a property in bad condition (e.g. they may include past images showcasing the property in its best light). In these cases the **text description can be used to infer if there is something about the property that should be further investigated.**
- We explore two options to help predict poor properties: 1) a state-of-the-art NLP model – BERT transformer architecture 2) a simple more explainable model - Logistic regression applied to TF-IDF vectorized text



Transformer based NLP architectures like Roberta have shown to outperform traditional language models due to being pre-trained on large datasets and the ability to take a greater level of context of words into consideration via bi-directional encoded representations. These factors giving them a distinct advantage over traditional methods.

hometrack ZOOPLA

NLP Model
Analysis of text

- Good conditions property listings often contains descriptions of ‘modern’ or ‘new home’ properties which are ‘well presented’ and ‘maintained to a high standard’.
- Poor properties often contain phrases such as ‘requiring updating’, ‘need modernisation’ or ‘investment opportunity’. Other phrases such as ‘dining room’ are considered to be an indication that the property is older, as newer properties tend to have integrated kitchen dining areas.
- Phrases such as ‘chain’ and ‘window’ are also included as they often appear with phrases such as ‘no chain’ and ‘no upward chain’ or ‘double glazed windows’ which are often used as key positive descriptions for poorer properties which often don’t have much else to promote.

y=Good top features

Weight?	Feature
+2.542	modern
+2.049	ensuite
+1.768	integrated
+1.710	landscaped
+1.310	area
+1.303	presented
+1.243	home
+1.241	standard
+1.225	well
+1.203	new
... 40557 more positive ...	
... 57825 more negative ...	
-0.951	room
-0.953	investment
-1.110	opportunity
-1.156	rear
-1.178	power points
-1.214	room kitchen
-1.232	modernisation
-1.329	need
-1.720	potential
-1.742	property

y=Poor top features

Weight?	Feature
+5.252	modernisation
+5.128	need
+4.250	potential
+3.141	opportunity
+2.962	window
+2.927	chain
+2.830	need modernisation
+2.608	dining room
+2.501	refurbishment
+2.312	updating
... 32543 more positive ...	
... 65839 more negative ...	
-2.668	apartment
-2.812	lovely
-2.906	integrated
-2.927	new
-3.112	recently
-3.143	ensuite
-3.155	area
-3.571	well presented
-4.679	presented
-5.702	modern

Advanced condition analysis - Damage detection

In addition to the Poor Condition score we can eventually detect specific defects

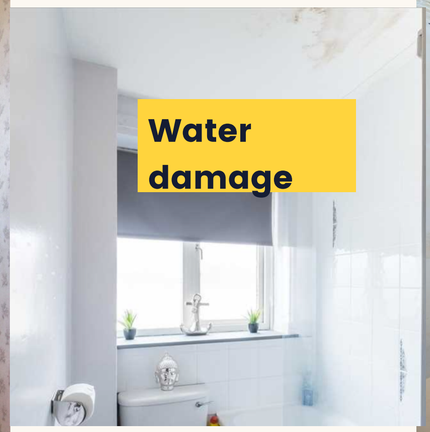

Structural damage


Broken roof tiles


Damaged render


Ceiling Damage

Damaged floors


Water damage


Wall damage


Rotting window frames

Advanced condition analysis - In need of modernisation





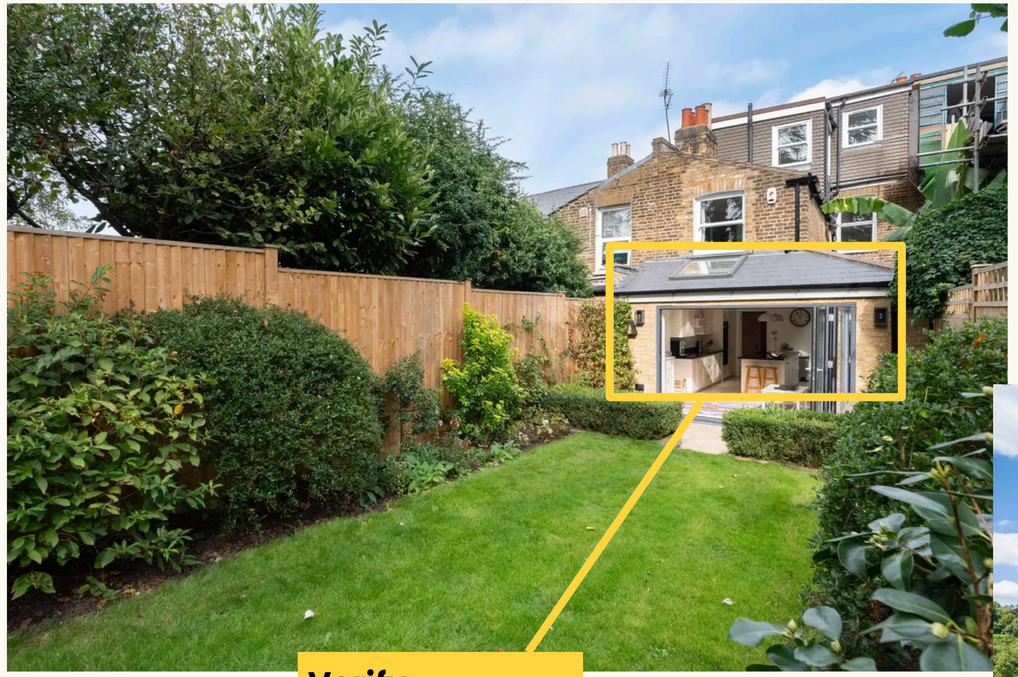




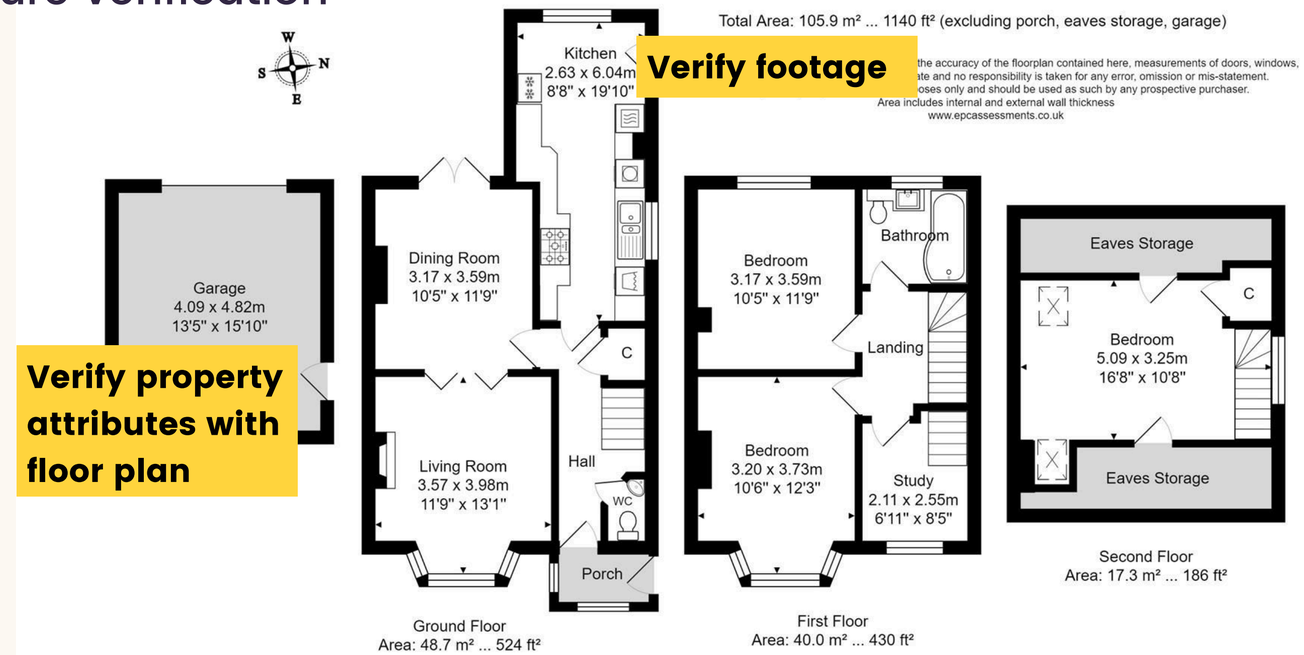




Create More Accurate Valuations – Property feature verification



Verify extensions have been completed in property





Check for outbuildings

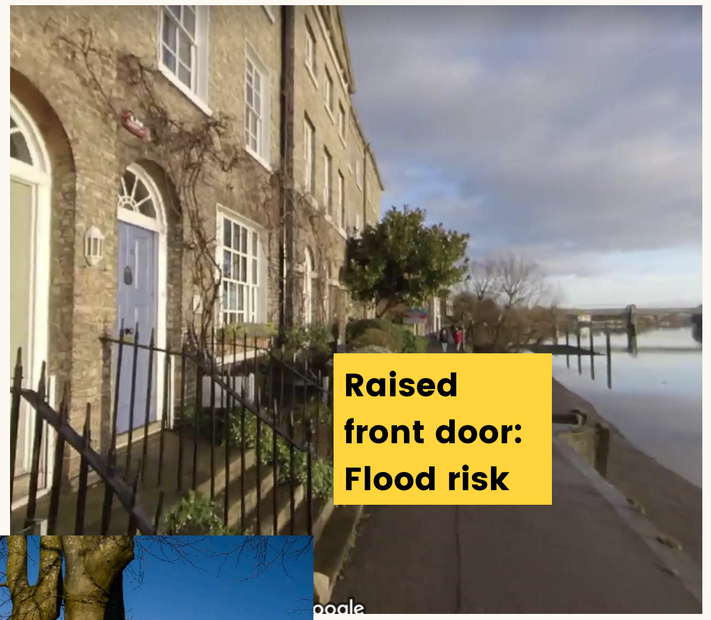
Identify features for our Climate products



Solar Panels: Energy Efficiency



Conservatory: Energy Efficiency



Raised front door: Flood risk



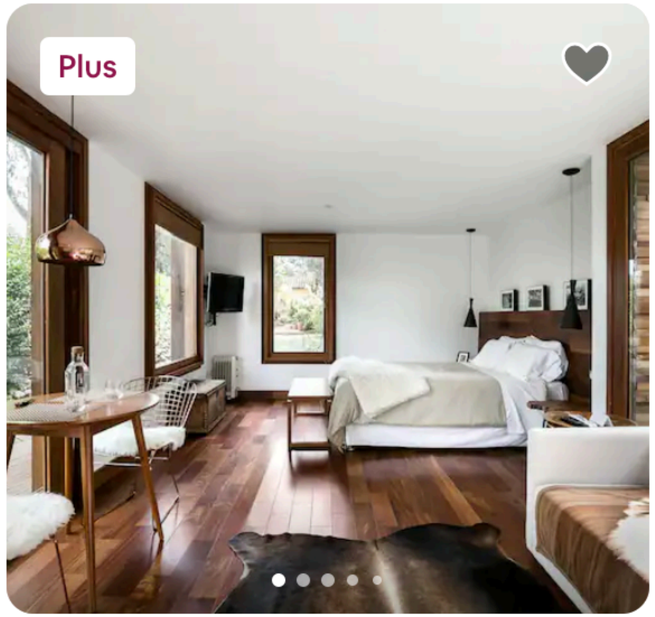
Skylights: Greenhouse effect



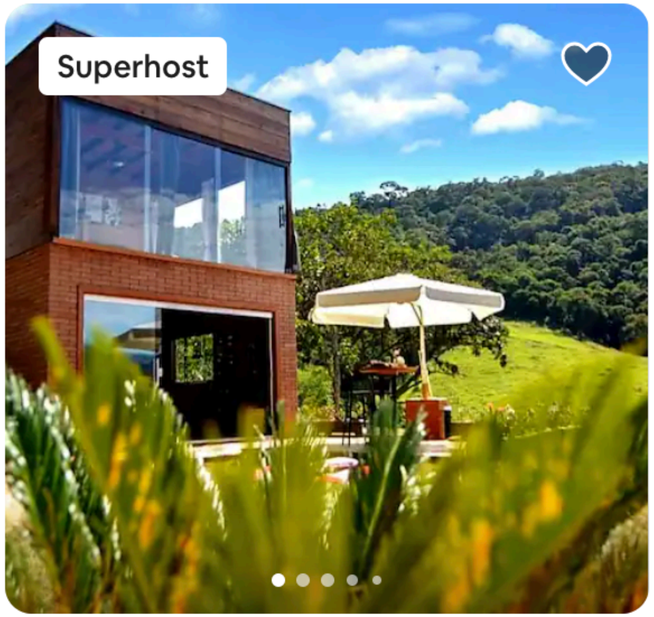
Tree Proximity: Wildfire/ Subsidence risk

Using Computer Vision to Understand Consumer Preferences

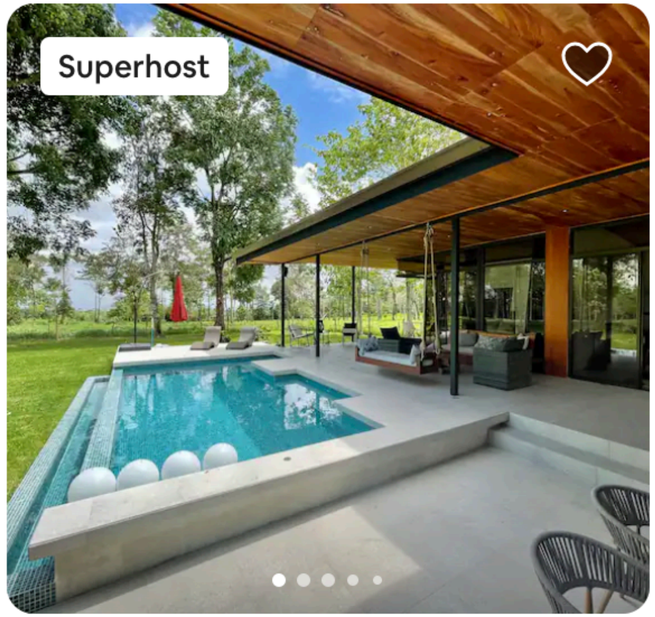
Airbnb found that along with price and location, the photos of a property were the biggest influence when securing a booking.



Cabin in Cusco, Peru ★ 4.95 (297)
Cuzco Stylish Getaway Cabin below...
Individual Host
10–15 May
£131 night · £651 total



Chalet in Paraisópolis, Brazil ★ 4.9 (139)
Brakiarias Havenna Home
Individual Host
14–19 May
~~£109~~ **£98** night · £489 total



Home in San Cayetano de ... ★ 4.97 (90)
Quinta La Ceiba Modern Home with Poo...
Individual Host
17–22 May
£196 night · £976 total

Smart Property Tags

We are creating additional tags on property features (e.g. “kitchen island”, “bath”,”garden”), lifestyle themes (e.g. “Sea View”) and style (e.g. “Victorian”, “Cottage”). The ultimate goal would be to build a layer of 100+ labels to add to our property data to serve various purposes across the business.





Adding a layer of structure with “labels” on top of our data using advanced Data Science capabilities e.g. computer vision and NLP

Leasehold, Top floor **Victorian conversion** flat, Open-plan reception room, **Modern bathroom,** Close to amenities, Close to transport links.

A stunning top-floor Victorian conversion flat which has **undergone full refurbishment.**

Boasting an abundance of **natural light,** the living room has an excellent open-plan flow which is complemented by a **chic modern kitchen** with integrated appliances, ample space for dining, and **great storage options.** The bathroom is stylish in design whilst the bedroom is well-proportioned and benefits from **integrated storage.**

Colvestone Crescent is perfectly located to enjoy the bustling amenities of Kingsland High Street, Ridley Road and Hackney Downs which are all located moments from the property. The East London hotspots of London Fields, Broadway Market and Church Street Stoke Newington are **also easily accessible** as well as a host of primary and secondary schools which have earned the coveted **Ofsted 'outstanding' rating.** Transport wise, access to both Dalston Kingsland and Dalston Junction Overground Stations are a short

VICTORIAN

OPEN PLAN

MODERN BATHROOM

RECENTLY REFURBISHED

NATURAL LIGHT

MODERN KITCHEN

GOOD STORAGE OPTIONS

WELL CONNECTED

ACCESS TO GOOD SCHOOLS

Property Attributes

- Bath
- Gym
- Garden
- Office
- Driveway
- Garage
- …

Architectural styles

- Art Deco
- Victorian
- Period
- …

Property Style/ Condition

- New build
- Fixer-upper

Property Type

- Houseboat
- Barn
- Cottage
- …

Property Location

- Waterfront
- Sea View
- Lake View
- …

Aesthetic appeal of interiors - style recognition



Edwardian



Victorian

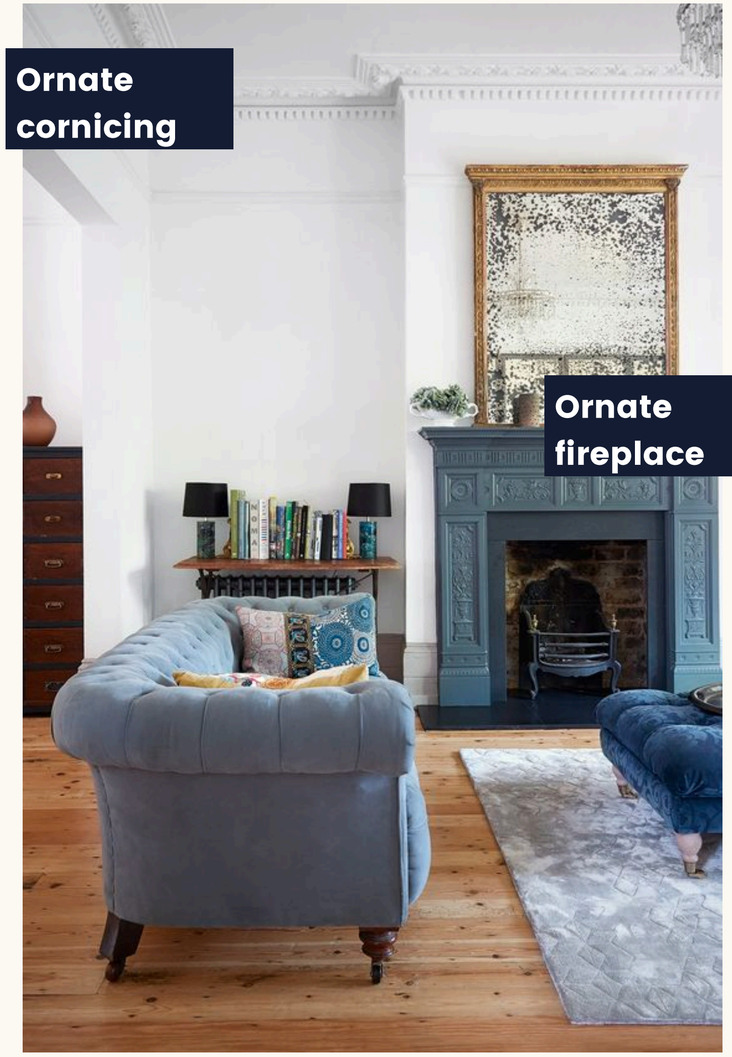


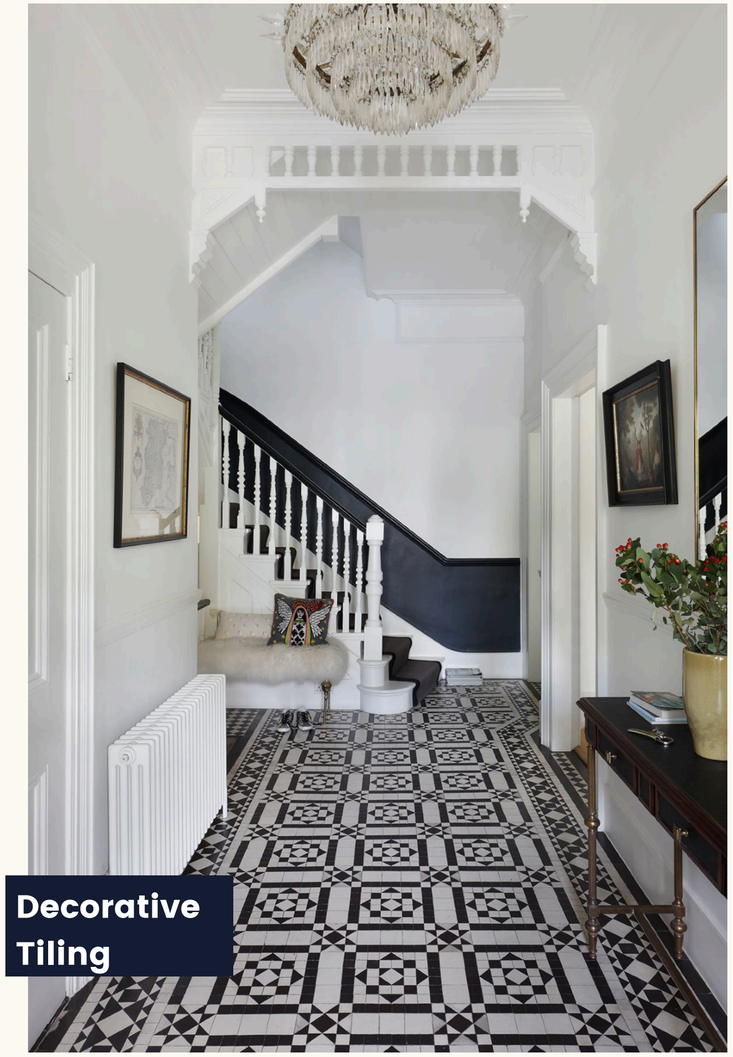
Georgian



New Build

Aesthetic appeal of interiors - historical features



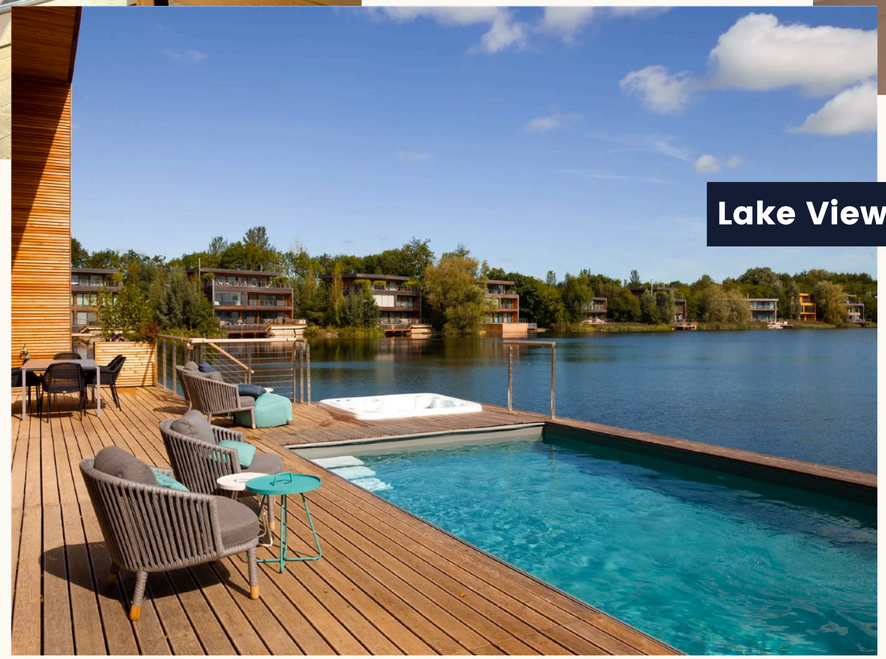




Aesthetic appeal – views









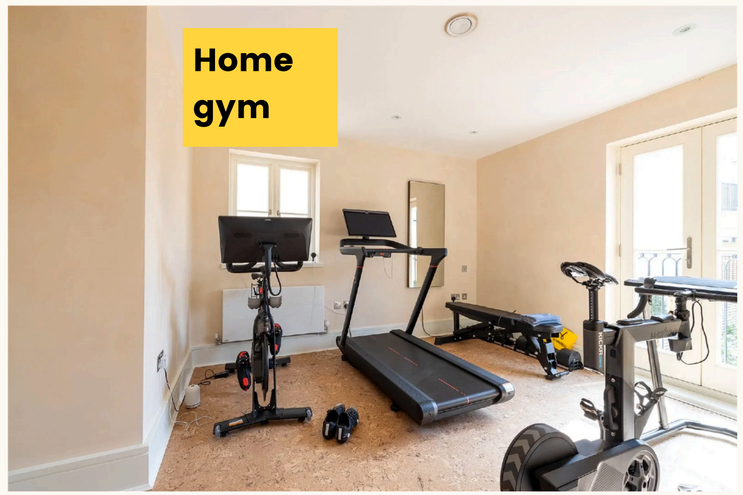
Identify additional property features like swimming pools and island kitchens











Labelling with the help of ChatGPT

We are passing each property listing text to ChatGPT and asking it a number of questions:

- **Is this property in need of modernisation/updating?**

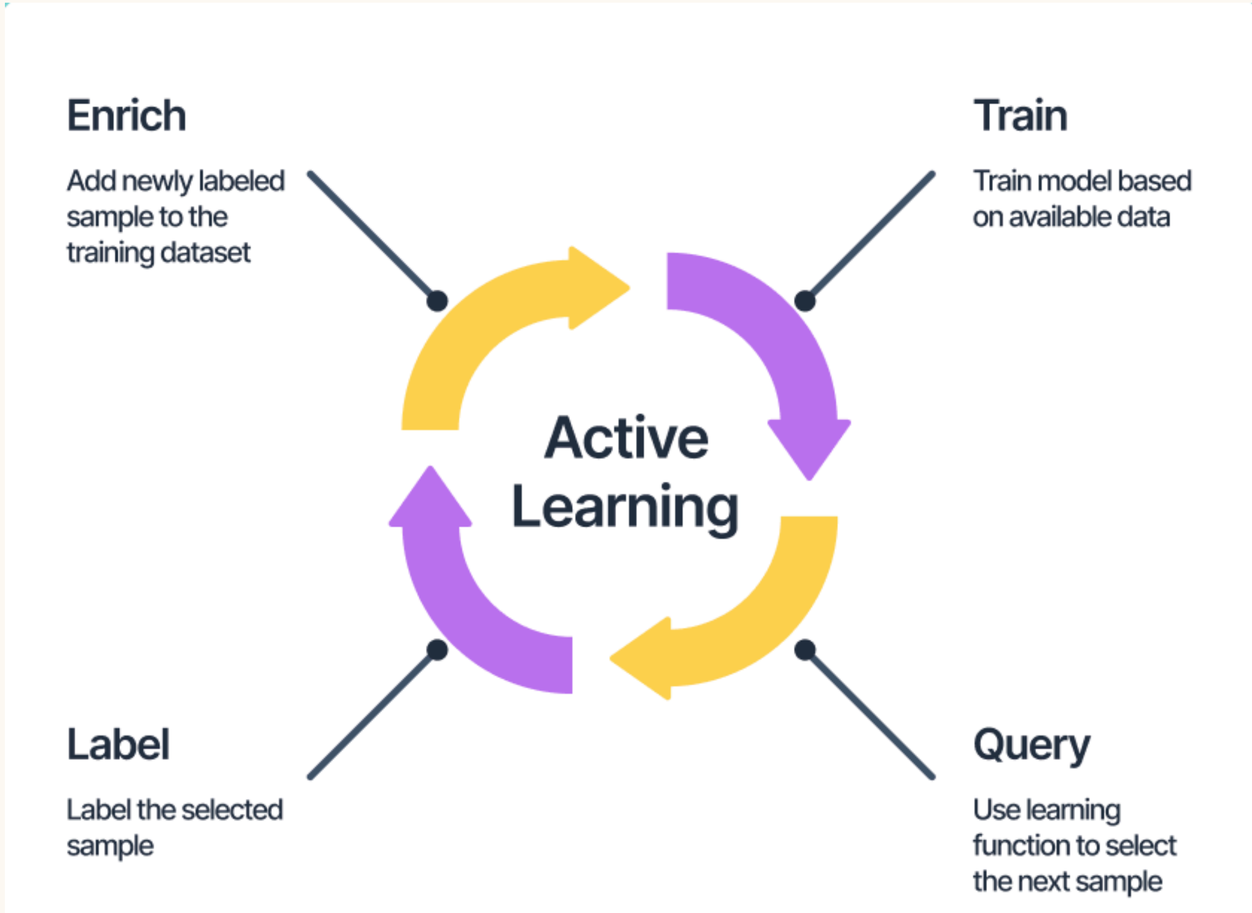
  - **yes** - the listing states the property is ‘in need of modernisation throughout.’
  - **maybe** - the property is described as a development opportunity, which may imply it needs modernising.

- **Is this a period property?**
  - **yes** - the property is described as an Edwardian property.
  - **maybe** - the text mentions Marylebone's rich history and classic London mansion block style, but it is not clear if the property itself is a period property.

These results are not always perfect and still require manual checking. This technique has enabled us to subset the data to more quickly identify examples for each tag.

Active Learning

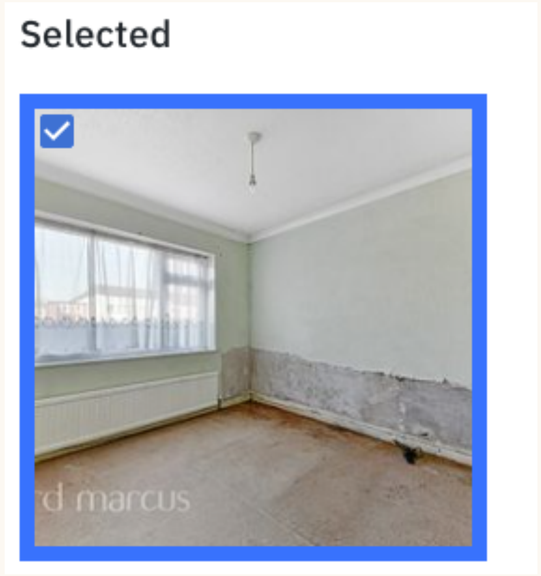
Active Learning is a strategic approach that optimizes the labeling process by focusing on examples where the model exhibits the highest uncertainty, thereby improving learning efficiency and effectiveness.

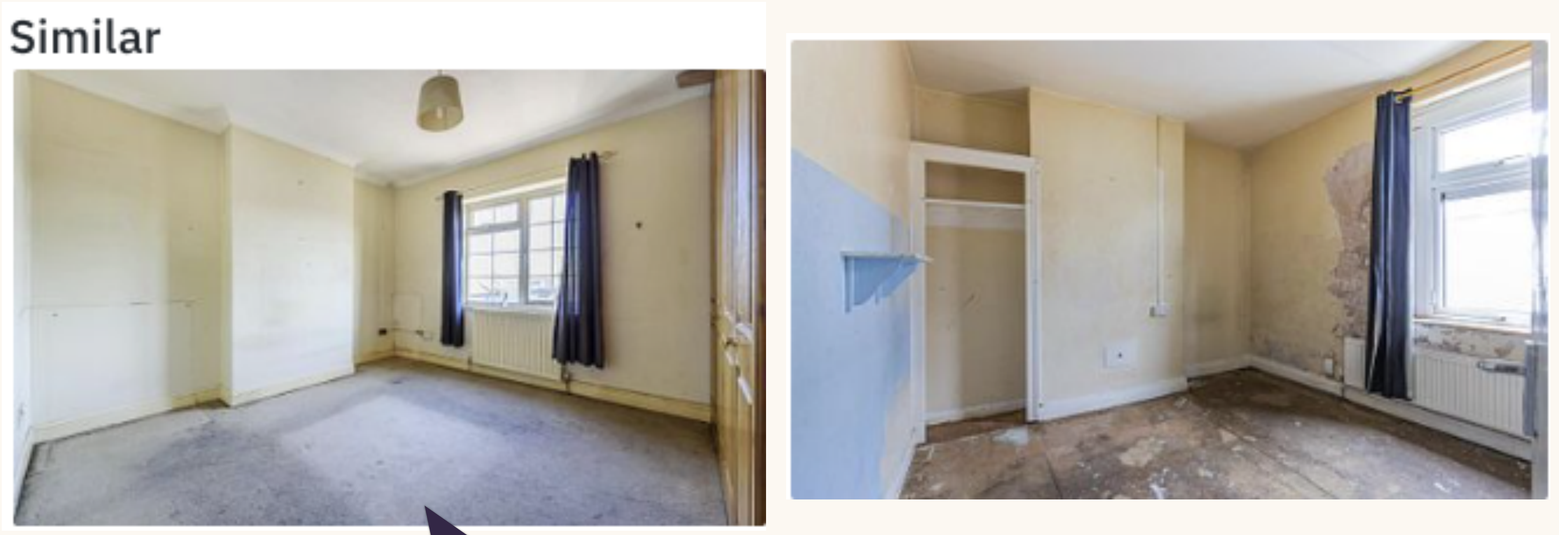


Query strategies in active learning refer to methods used to select informative samples to be labeled by a human annotator, with the goal of improving the model's accuracy.

Active Learning - identifying the correct samples to label

- **Identify Uncertain Images:** Use querying strategies to pinpoint images where the model shows prediction uncertainty, typically indicated by probability scores between 0.40 and 0.60.
- **Find Similar Samples:** Apply embedding similarity techniques to locate and incorporate additional samples that are similar to the uncertain images, thereby enhancing model accuracy in image recognition.



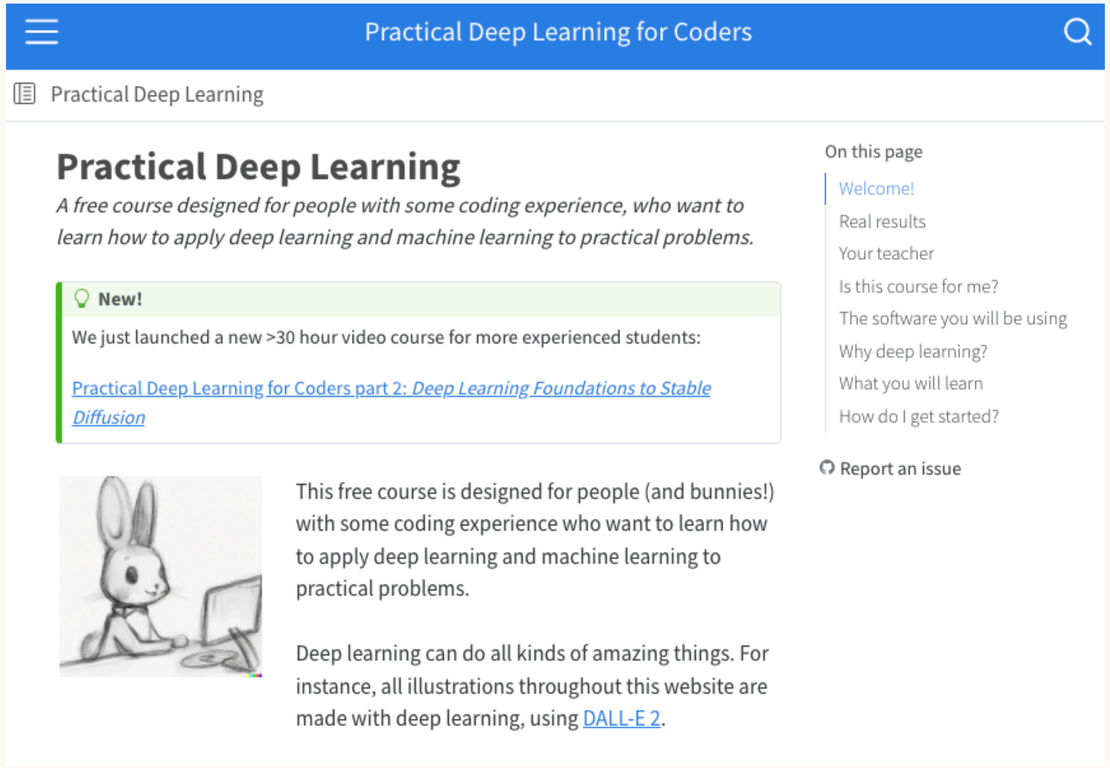


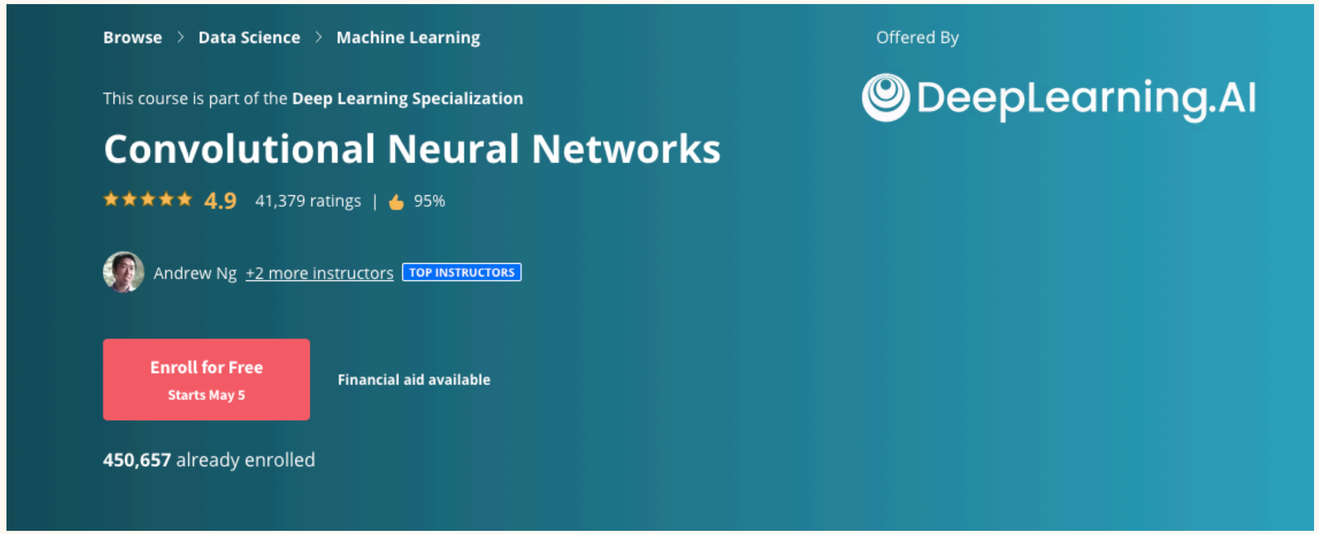
Using image embeddings to identify **similar** images to the ones that are failing and feeding this back to the model training can vastly help improve results.

Getting started with Computer Vision

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You don't have to be a Data Scientist to create computer vision models



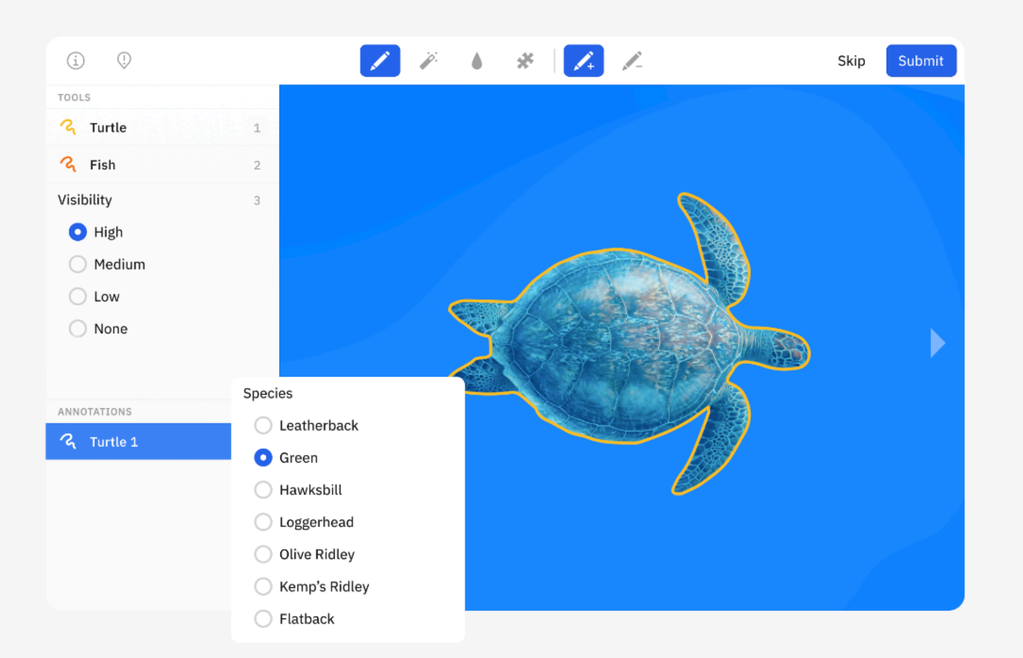


fast.ai

Making neural nets uncool again

DeepLearning.AI

Creating a high quality labelled dataset is critical - you can then get away with fewer examples



Labelbox

ENCORD

Label Studio



Some more tips...

- **Imbalanced datasets** - the number of examples in one class greatly outnumbers the examples in another
  - Class weighting
  - Oversampling

- **Watch out for data leakage** - ensure you don't let your test data "leak" into your training data. This can happen if you keep optimising your model to work well with your test data. This can give you a false sense of confidence your model is doing well. Make sure you keep a test set completely separate from your validation process. Most people will have three splits train/ validation and a completely different test set only looked at in the end.

- **Let the model performance guide additional labelling you need.** Start by labelling a random 500 images. See what the model is failing to perform well on and look for more images that show the examples the model is failing on, label those and feed them back into the training set. This can speed up model iteration massively.

- **Use ChatGPT to help with your labelling!**

BEAUTIFUL PLACES

A COMMUNITY DRIVEN AI APPROACH TO CREATE MORE BEAUTY IN OUR LIVES....

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We intuitively grasp the profound influence of beautiful places. They enhance our personal joy, solidify community bonds, and act as catalysts for economic prosperity.

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However, their quantifiable value remains elusive. Beautiful Places AI bridges this gap, delivering vital data to empower initiatives that help safeguard and create more beauty in the world.

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Beautiful Places AI is a Community Interest Company

- A Community Interest Company (CIC) is specifically structured for social enterprises that aim to benefit the community rather than private interests.

- Our organisational foundation is "Limited by Guarantee," which solidifies our position as a non-profit entity.

- With a CIC we can still monetise curated data, for example, selling high level Beautiful Places insights to entities such as property or travel companies. The profits generated are purposefully directed towards various social good projects and research initiatives that we choose.

- Fundamentally, being established as a CIC ensures the Beautiful Places Data itself is securely protected with an asset lock. This allows the data to continuously serve and empower global communities, reinforcing our unwavering commitment to positive social impact.

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1

Using a combination of crowdsourced data and machine learning, we want to create large scale, high resolution beautiful places data for every country in the world in order to provide objective information on beauty to support decision making worldwide.

While we will start with data for the United Kingdom, next year we plan to launch our data for cities around the world.



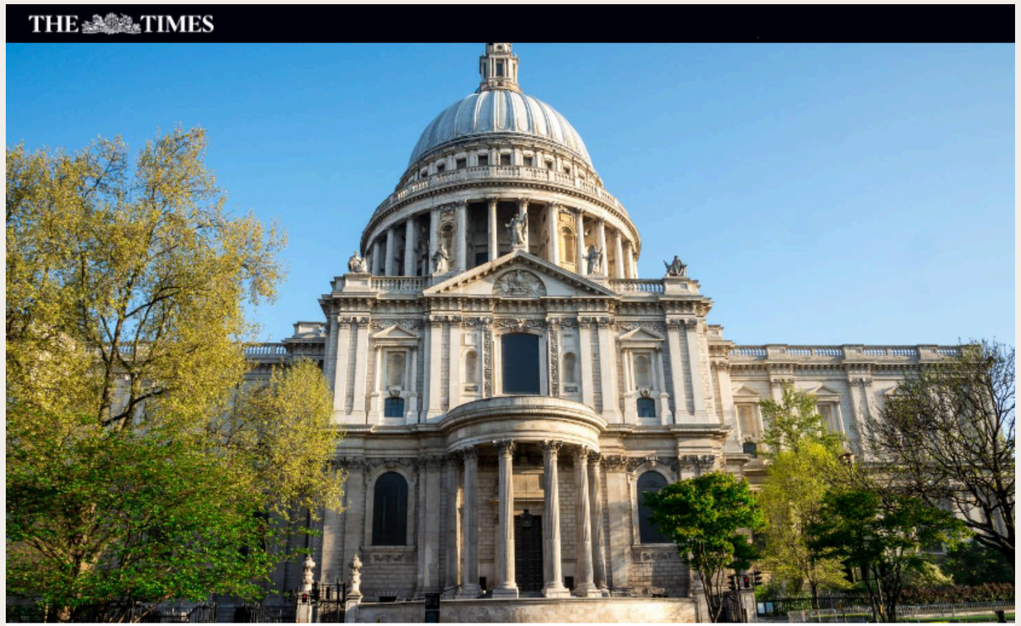
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2

We will use this data for research projects to understand the impact of beautiful places on human and economic wellbeing.

Armed with quantitative evidence, public good organisations and local communities can make more informed decisions about the creation and conservation of beauty in neighbourhoods.

We aim to use the insights from our algorithm to guide how to design our cities to be more beautiful and liveable spaces



Papers already published:

Seresinhe, C. I., Preis, T., & Moat, H. S. (2015). Quantifying the Impact of Scenic Environments on Health. Scientific Reports, 5, 16899.

Seresinhe, C. I., Preis, T., Mackerron, G. & Moat, H. S. (2019). Is Happiness Greater in More Scenic Locations? Large Scale Evidence From Mobile Phone And Online Data. Scientific Reports, 9, 4498.

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Current research

Using generative models to better understand intrinsic urban design factors and combinations that contribute to Beautiful Places



Could include:
ornateness
greenery
density
activity
..

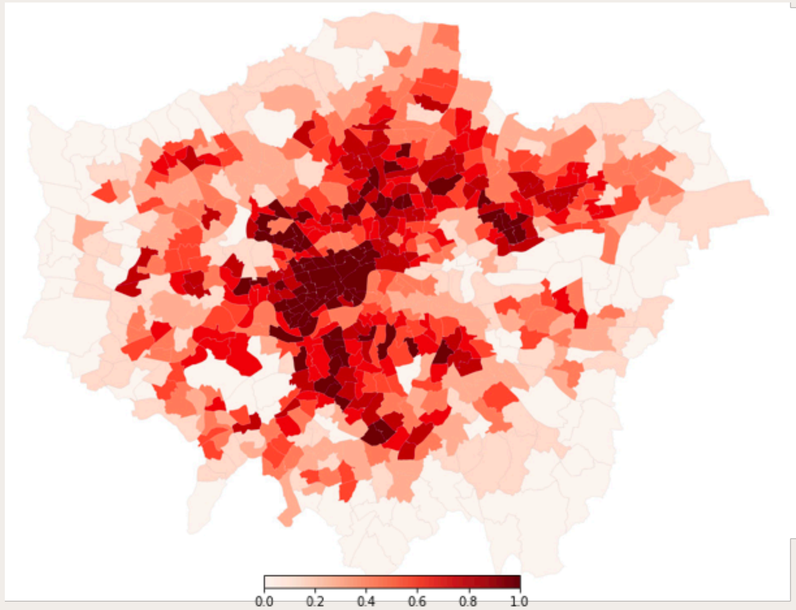
Related research:

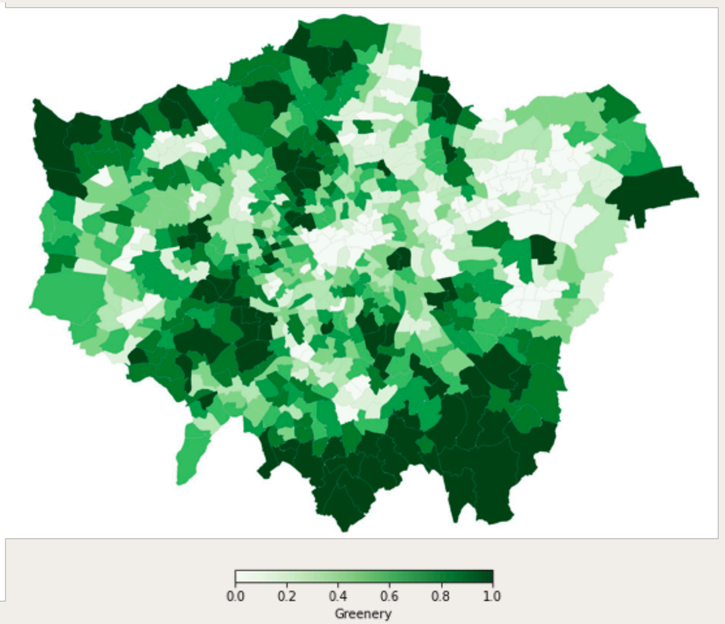
Law, S., Hasegawa, R., Paige, B., Russell, C., & Elliott, A. (2023). Explaining holistic image regressors and classifiers in urban analytics with plausible counterfactuals. International Journal of Geographical Information Science, 1-22.

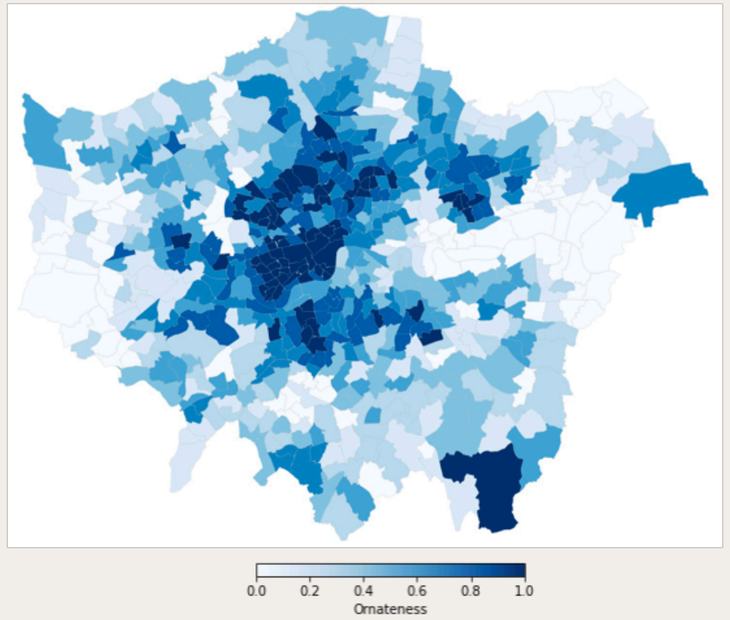
Law, S.; Seresinhe, C.I., Yao, S. Upcoming. The intangible value of street-level urban design using a machine learning approach: urban beauty, active frontage and street greenery.

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Current research

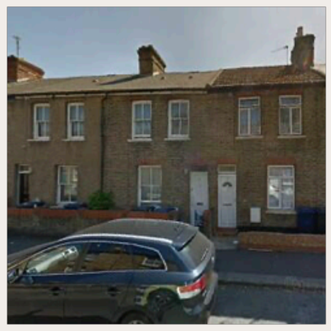










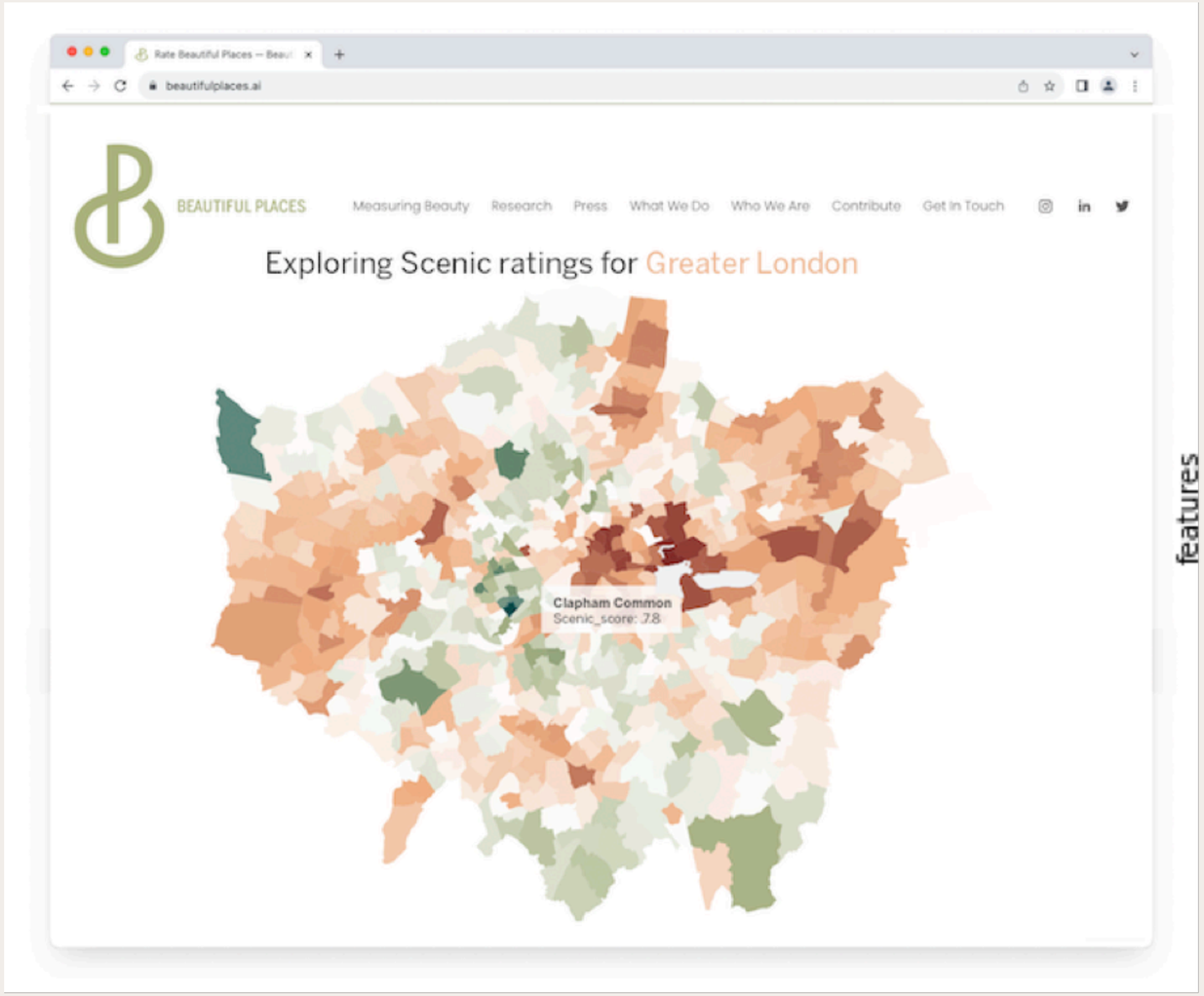


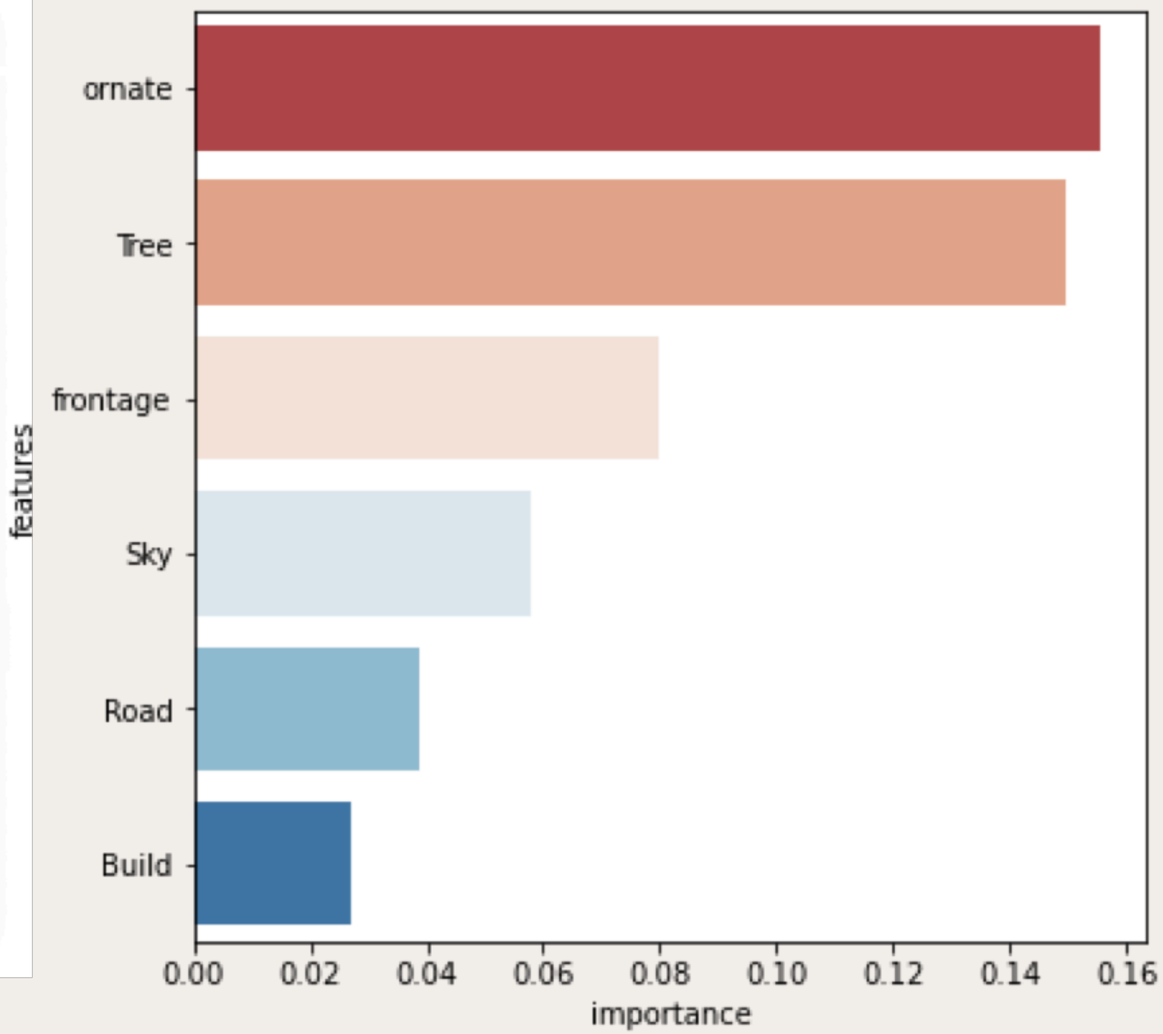


Law, S., Shen, Y., & Seresinhe, C. (2017). An application of convolutional neural network in street image classification: The case study of London. In Proceedings of the 1st ACM SIGSPATIAL workshop on GeoAI.
Law, S., Seresinhe, C. I., Shen, Y., & Gutierrez-Roig, M. (2020). Street-Frontage-Net: urban image classification using deep convolutional neural networks. International Journal of Geographical Information Science, 34(4), 681-707.
Law, S., & Neira, M. (2019). An unsupervised approach to geographical knowledge discovery using street level and street network images. In Proceedings of the 3rd ACM SIGSPATIAL workshop on GeoAI.
Madaleno, M., & Law, S. (2023). Valuing Aesthetic Features of the Public Realm: Evidence from London Town Centres. Available at SSRN 4474531.

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Current research





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3

We will collaborate with like-minded researchers, organisations and institutions that share our vision, offering them insights into the potential benefits of beautiful places.

In addition, we'll grant complimentary access to curated datasets and insights, to help amplify the positive impact this information can have on human and economic wellbeing.



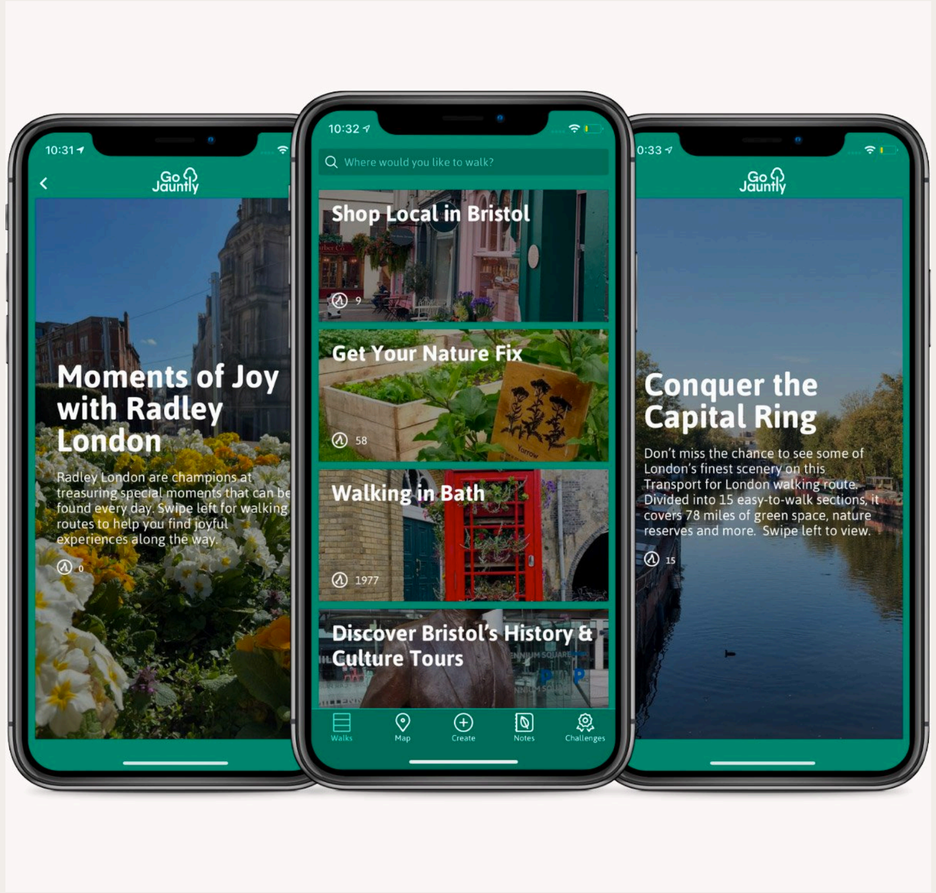
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Our Collaboration with Go Jauntly

Go Jauntly is a free community-based walking app that encourages outdoor exploration. It connects users to local walks, rich in green spaces, that are lovingly curated by knowledgeable locals, enhancing the walking experience through shared community insights.

We are planning to work with Go Jauntly to create a series of walks to make beautiful places more accessible to everyone.

The Beautiful Walks feature will be available free of charge.



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4

We plan to harness our data on beautiful places to craft tools that aim to bring the world's beauty closer to everyone – both globally and locally.

– Envision an app guiding you to nearby scenic gems, anywhere in the world

– Picture immersing yourself in breathtaking landscapes in the comfort of your home, tailored to your preferences.

– Imagine transforming a mundane street into an enchanting avenue using augmented reality on your daily commute.



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Our ultimate vision is to ensure everyone can access and appreciate beauty, regardless of where they are.

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BEAUTIFUL PLACES



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BEAUTIFUL PLACES

THANK YOU!

FIND OUT MORE AT BEAUTIFULPLACES.AI

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