

# TRAINING MACHINES TO SEE SCENIC BEAUTY

Chanuki Illushka Seresinhe, PhD

















Norham Castle, Sunrise c.1845, Joseph Mallord William Turner



Can we teach machines to discern the nuances of scenic beauty?





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Do **beautiful environments**  
have a quantifiable  
association with **increased**  
**wellbeing?**





Across all of  
England, people  
report better  
health when living  
in areas of greater  
beauty.

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





# Individuals are significantly happier when visiting environments that are more scenic

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



**What are beautiful places  
composed of?**



**We already know  
natural environments  
are linked to  
increased wellbeing**

Happiness is greater in natural environments  
George MacKerron<sup>a,b,c</sup>, Susana Mourato<sup>d</sup>

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<sup>b</sup>Financial Spatial Analysis, University College London, Gower Street, London WC1E 6BT, UK  
<sup>c</sup>Department of Geography & Environment,  
Political Science (LSE), Houghton Street, London WC2A 2AE, UK  
<sup>d</sup>Institute on Climate Change & the Environment, LSE

Social Science & Medicine  
Journal homepage: www.elsevier.com/locate/socscimed

Green space as a buffer between stressful life events and mental health  
Agnes E. van den Berg<sup>a,\*</sup>, Jolanda Maas<sup>b,c</sup>, Robert A. Verheij<sup>d</sup>

**ABSTRACT**  
This study investigated the presence of green space as a buffer between stressful life events and mental health. Data on health and life events were collected from a representative sample of 1,000 Dutch households. The results show that green space acts as a buffer between stressful life events and mental health. The presence of green space was associated with a 10% reduction in the risk of mental health problems. This effect was stronger for those who experienced stressful life events. The results suggest that green space can be used as a buffer between stressful life events and mental health. This study provides evidence for the importance of green space in promoting mental health. The results suggest that green space can be used as a buffer between stressful life events and mental health. This study provides evidence for the importance of green space in promoting mental health.



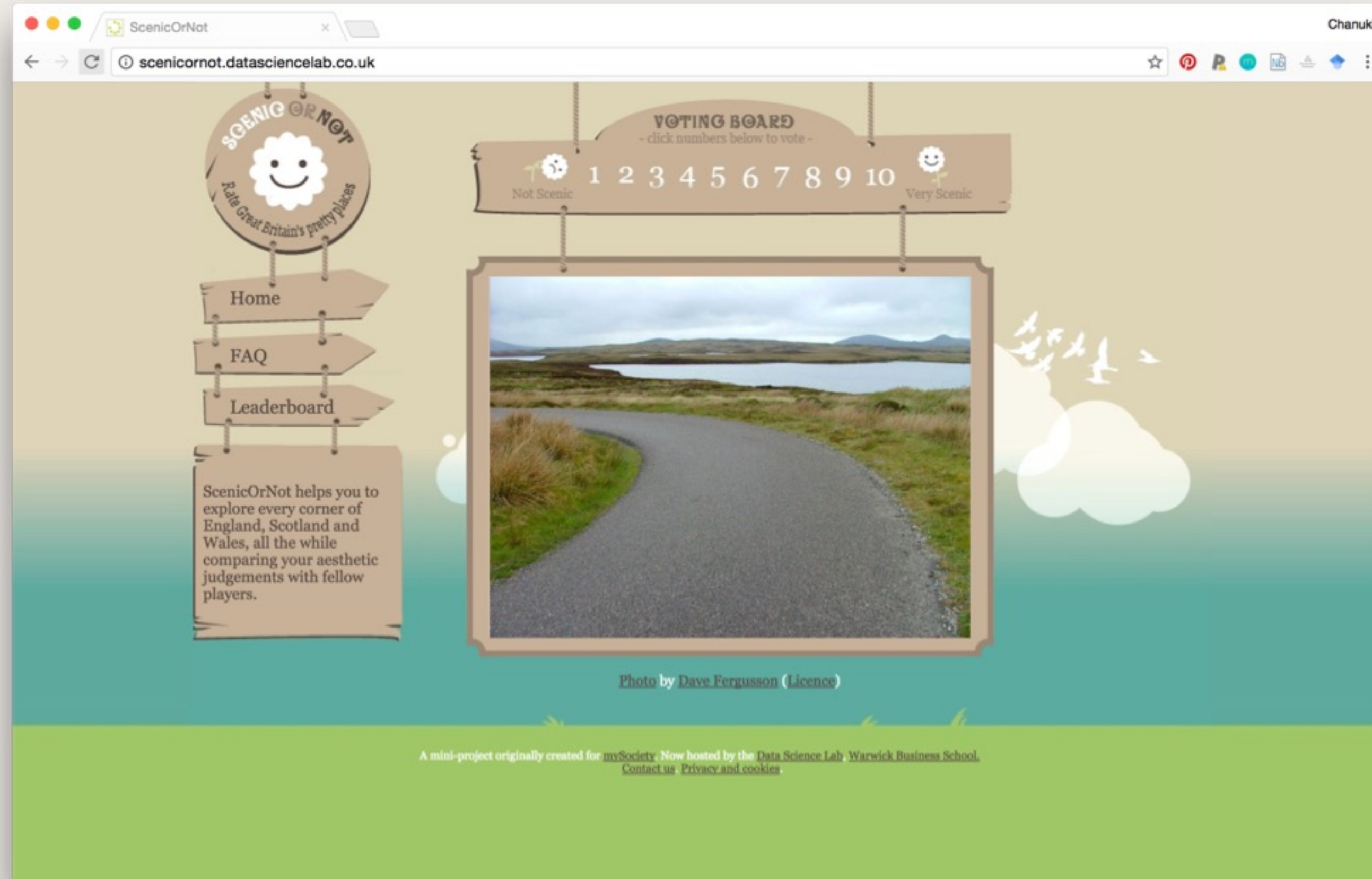
Journal of Environmental Psychology  
Journal homepage: www.elsevier.com/locate/jep

PUBLIC HEALTH POLICY AND PRACTICE  
Community and health: relationships in England

Graffiti, greenery, and  
of European cities  
Anne Ellaway, Sally Mearns



# Measuring Beauty with AI



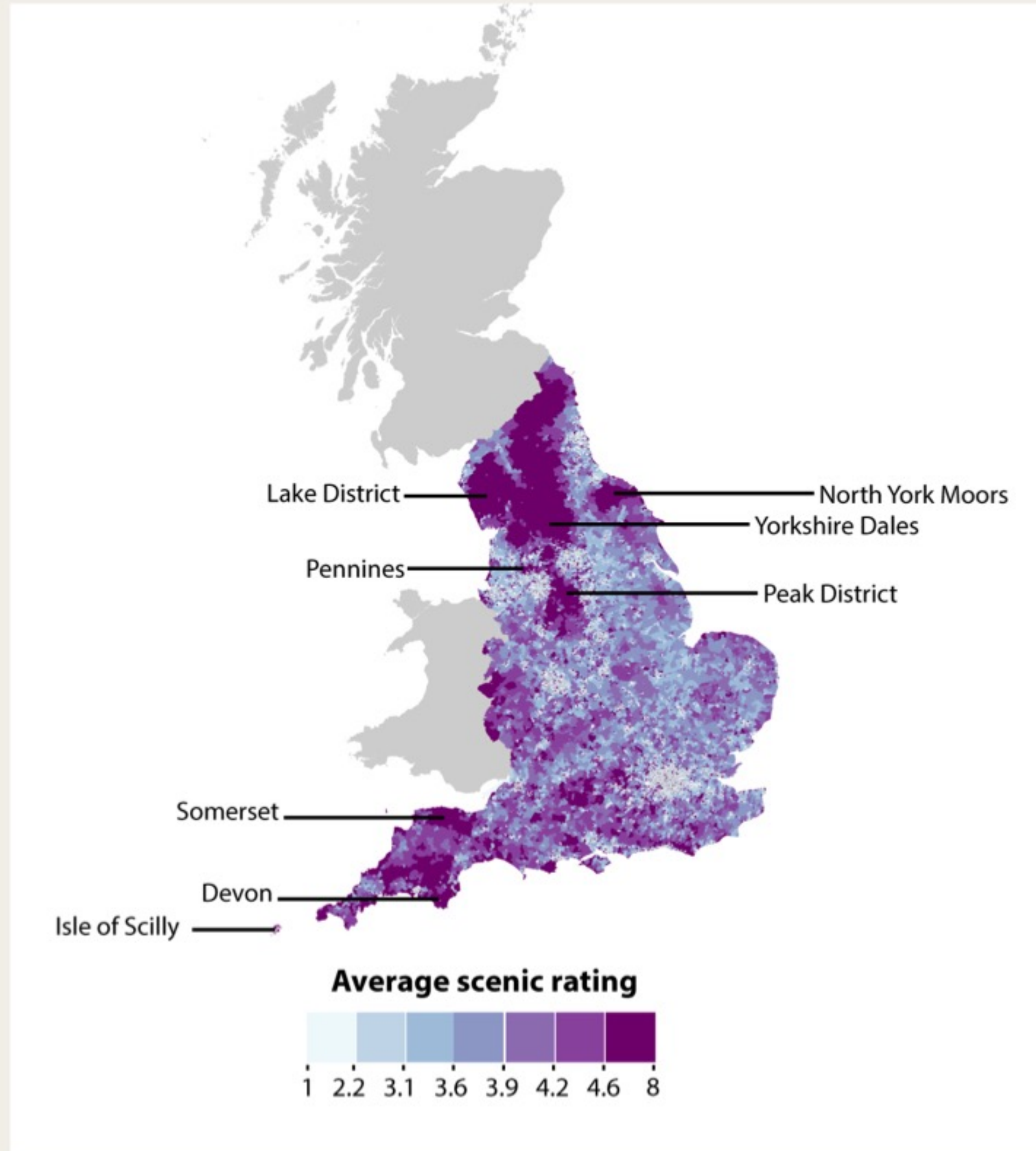
217,000 images  
1.5 million votes  
1 image per 1 km<sup>2</sup>

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.



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



# 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.





# Jay Appleton's Prospect and Refuge Theory

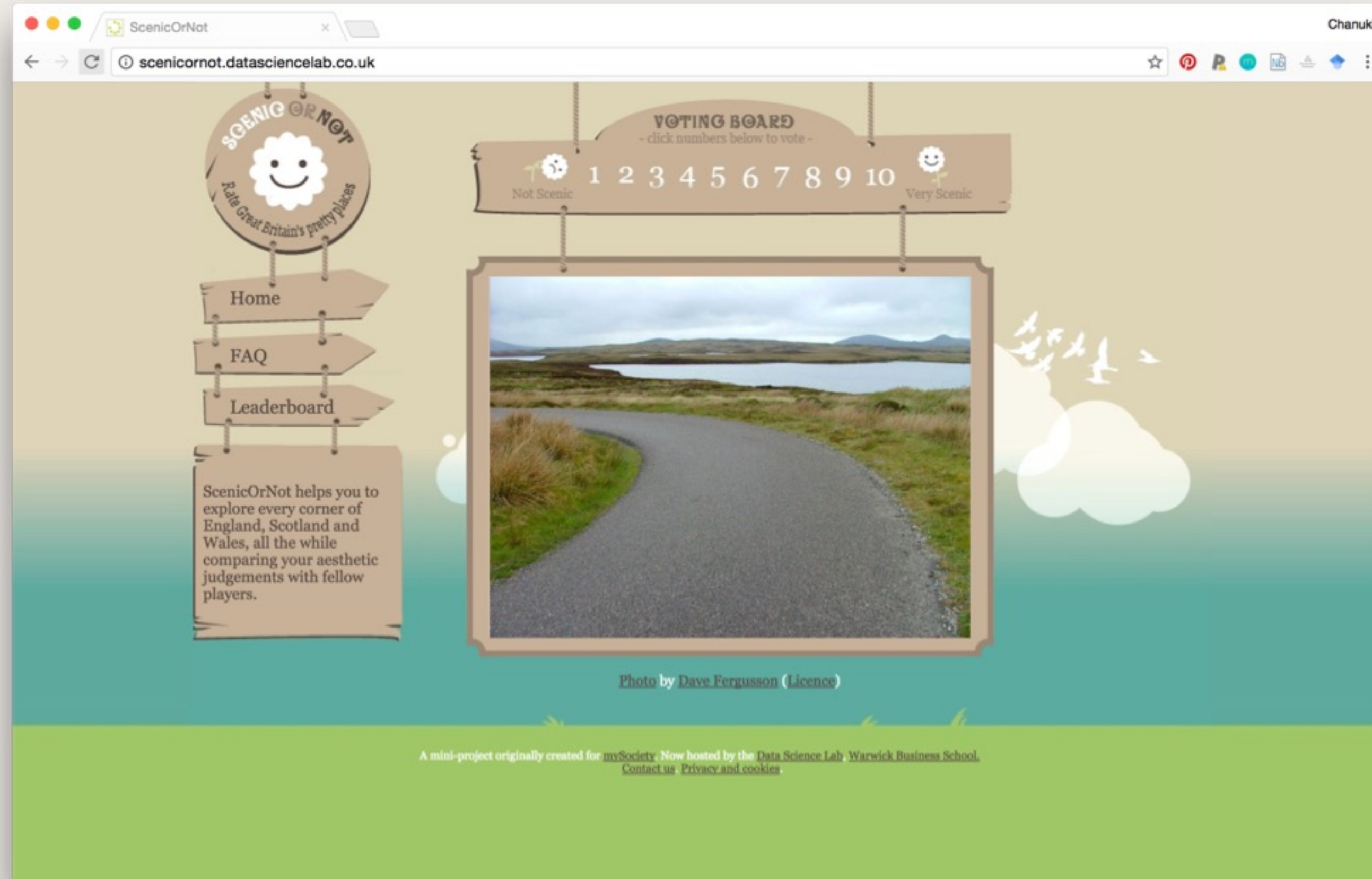
We have evolved to prefer outdoor spaces where one can easily view “prospects” as well as spaces that might contain “refuge” where one can easily hide and avoid potential dangers.

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





# Measuring Beauty with AI



217,000 images  
1.5 million votes  
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mySociety

geograph  
photograph every grid square!



# Measuring Beauty with AI

## MIT Places for Scene Recognition

**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.



**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



**Scenic**

**Coast**

**Valley  
Mountain**

**Forest  
Trees**



**Scenic**





**Scenic**



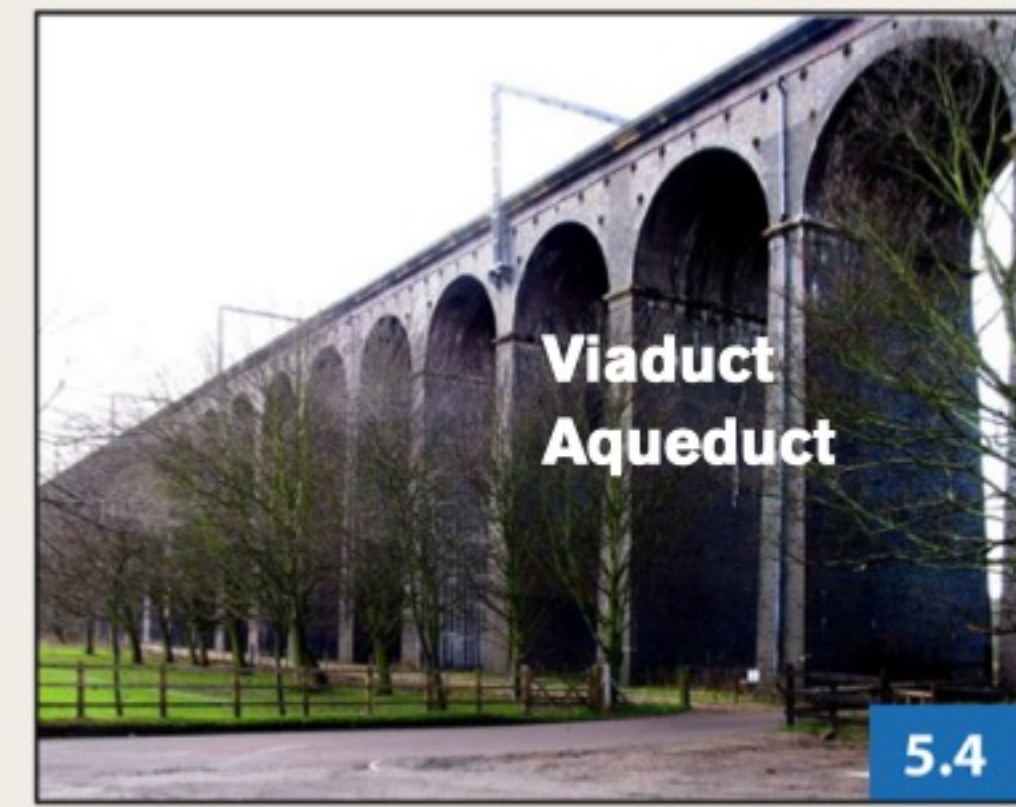
**Cottage**

**Lighthouse**

**Viaduct  
Aqueduct**

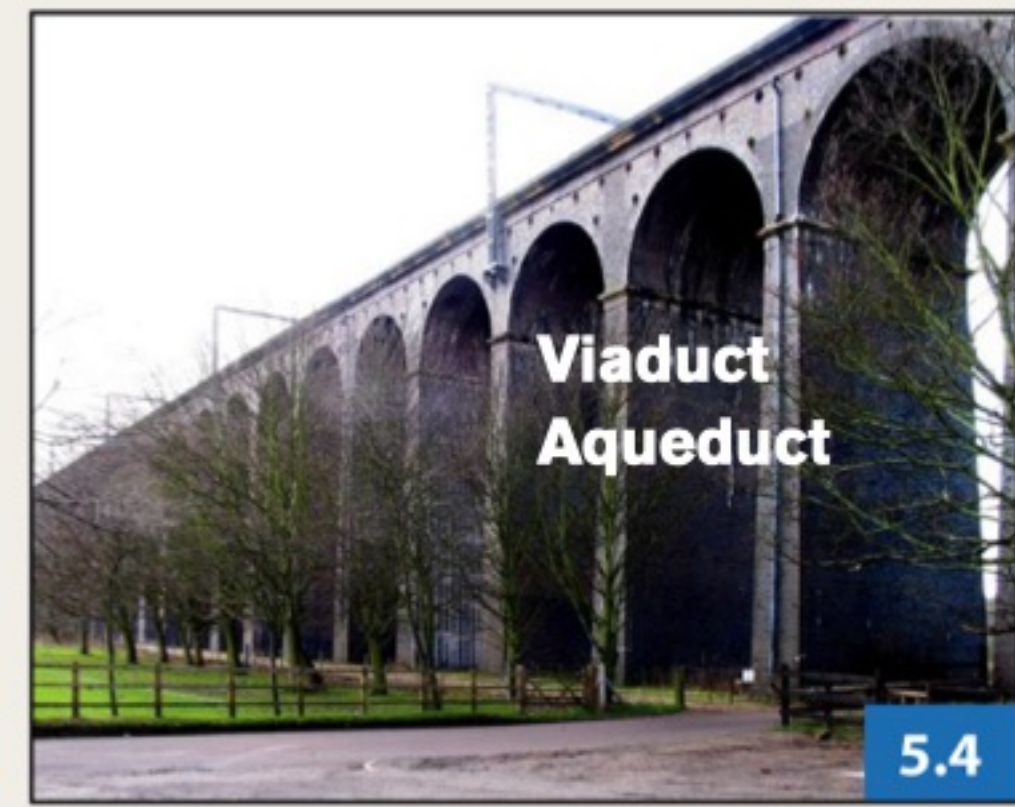


**Scenic**





**Scenic**



**Unscenic**

**Industrial  
Highway**



**Scenic**



**Unscenic**





**Scenic**



**Unscenic**



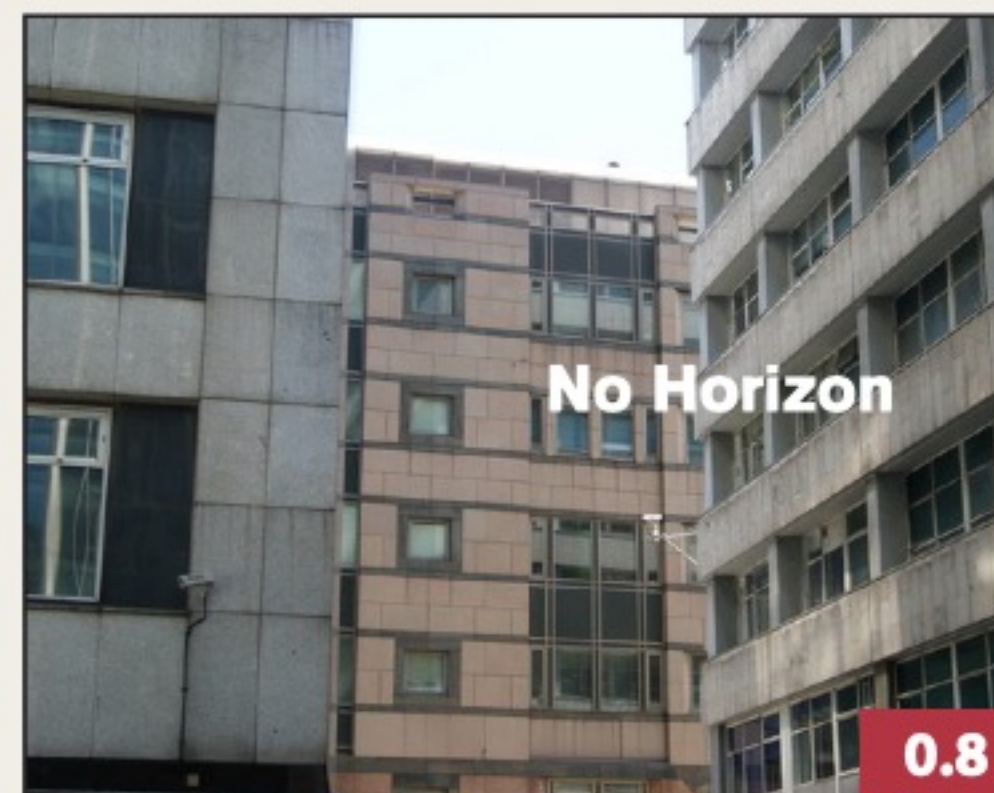
**No Horizon**



**Scenic**



**Unscenic**

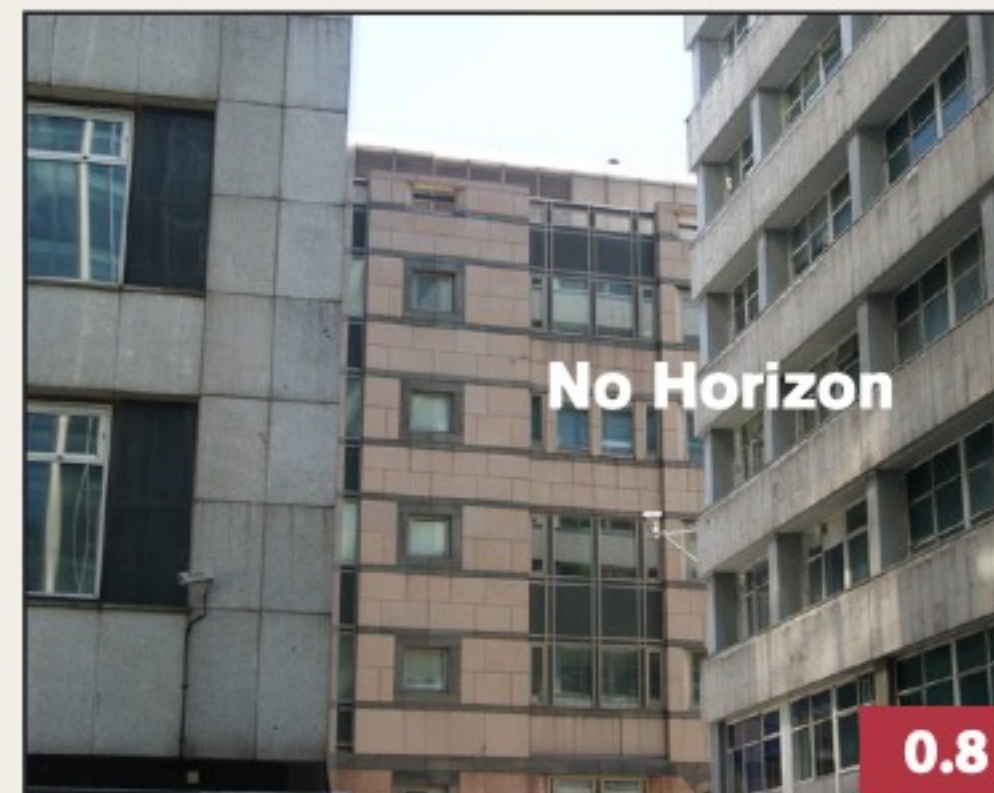




**Scenic**



**Unscenic**



Grass



Scenic



Unscenic





**1 image per 1 km<sup>2</sup>**

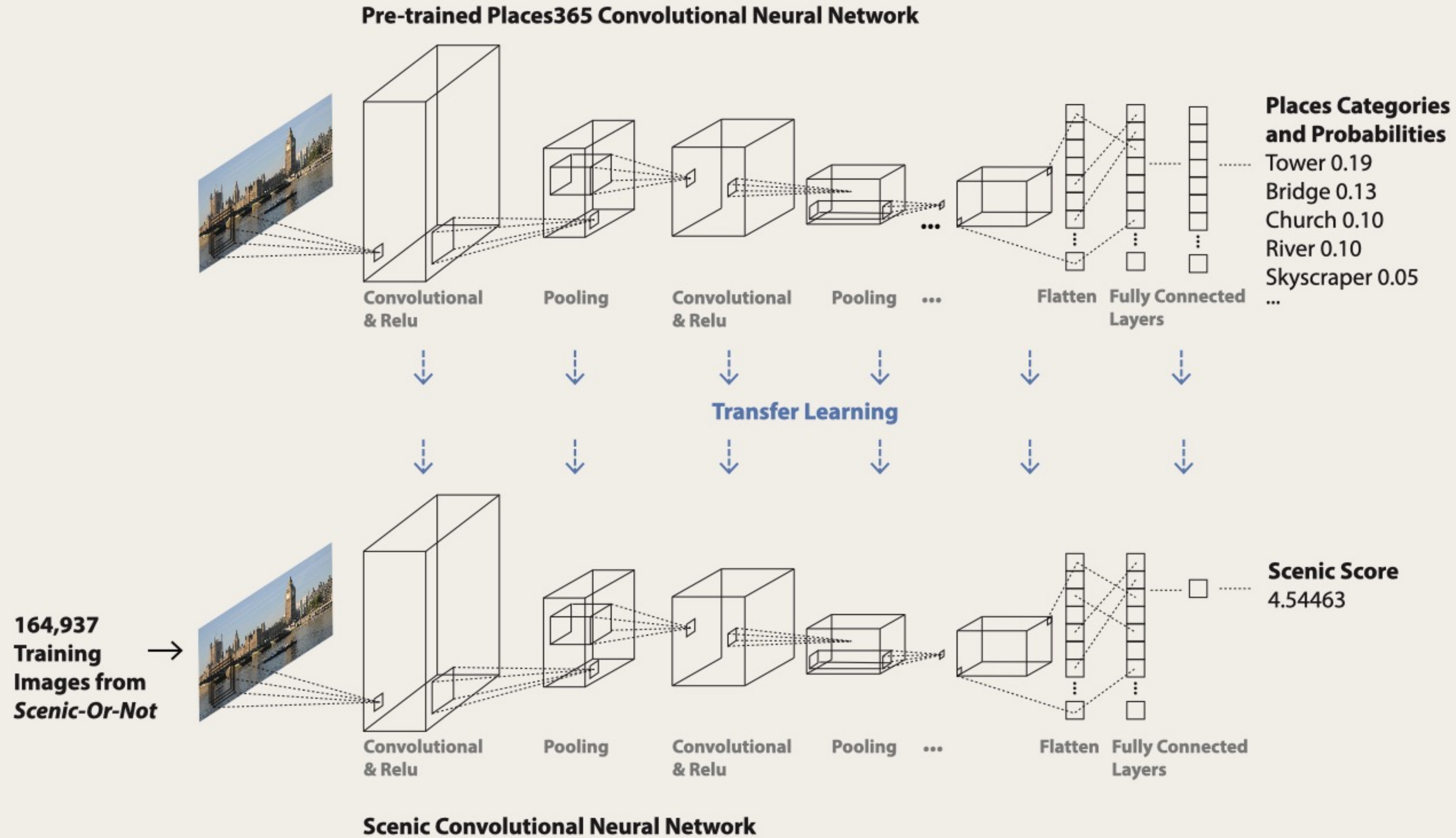




Can we use a **convolutional neural network** to help **predict the beauty** of novel images?



# Measuring Beauty with AI





# Measuring Beauty with AI

London Eye, London SE1 (C) x Chanuki

www.geograph.org.uk/photo/2492104

geograph  
photograph every grid square!

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london eye ges...

**TQ3079 : London Eye, London SE1** [Mark] [NW](#) [N](#) [NE](#)  
[W](#) [Go](#) [E](#)  
[SW](#) [S](#) [SE](#)

taken 6 years ago, near to Lambeth, Great Britain

[More sizes](#)



**London Eye, London SE1**  
This is how you see the Eye when approaching from Waterloo Station.

sponsored by  
Ordnance Survey

**This photo is linked from:**  
Automatic Clusters  
[Eye Eye](#)

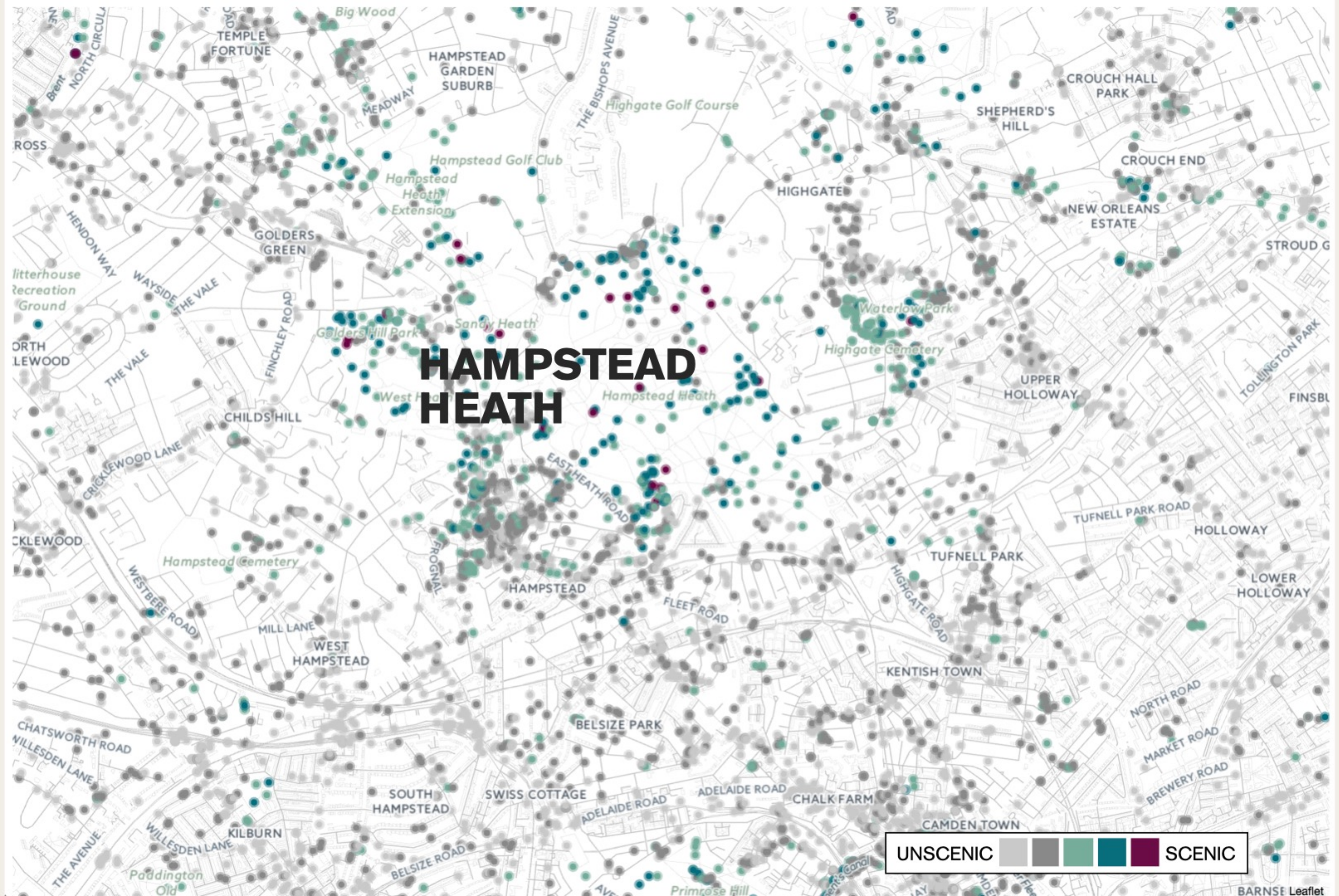


# HAMPSTEAD HEATH

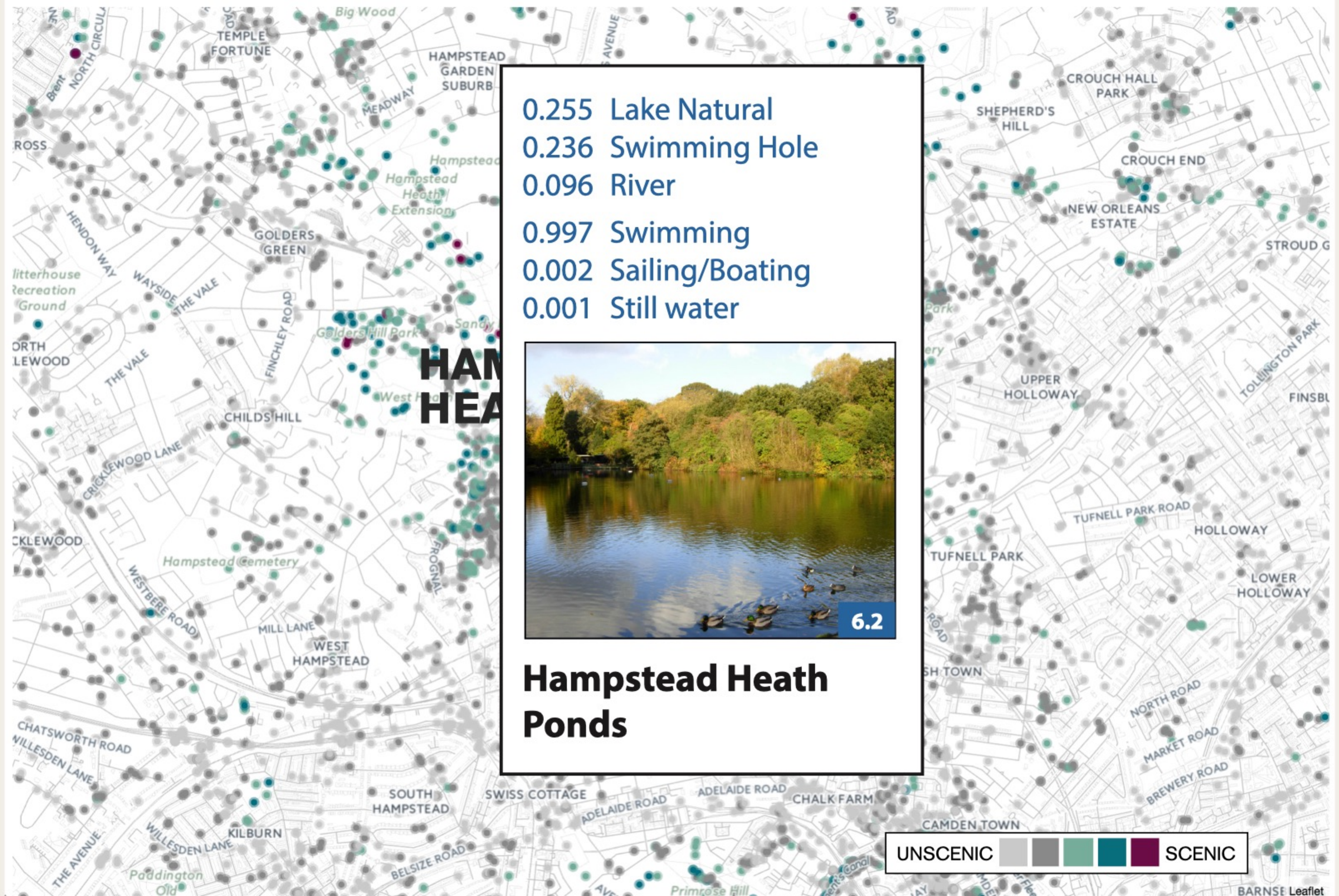




# HAMPSTEAD HEATH







- 0.255 Lake Natural
- 0.236 Swimming Hole
- 0.096 River
- 0.997 Swimming
- 0.002 Sailing/Boating
- 0.001 Still water

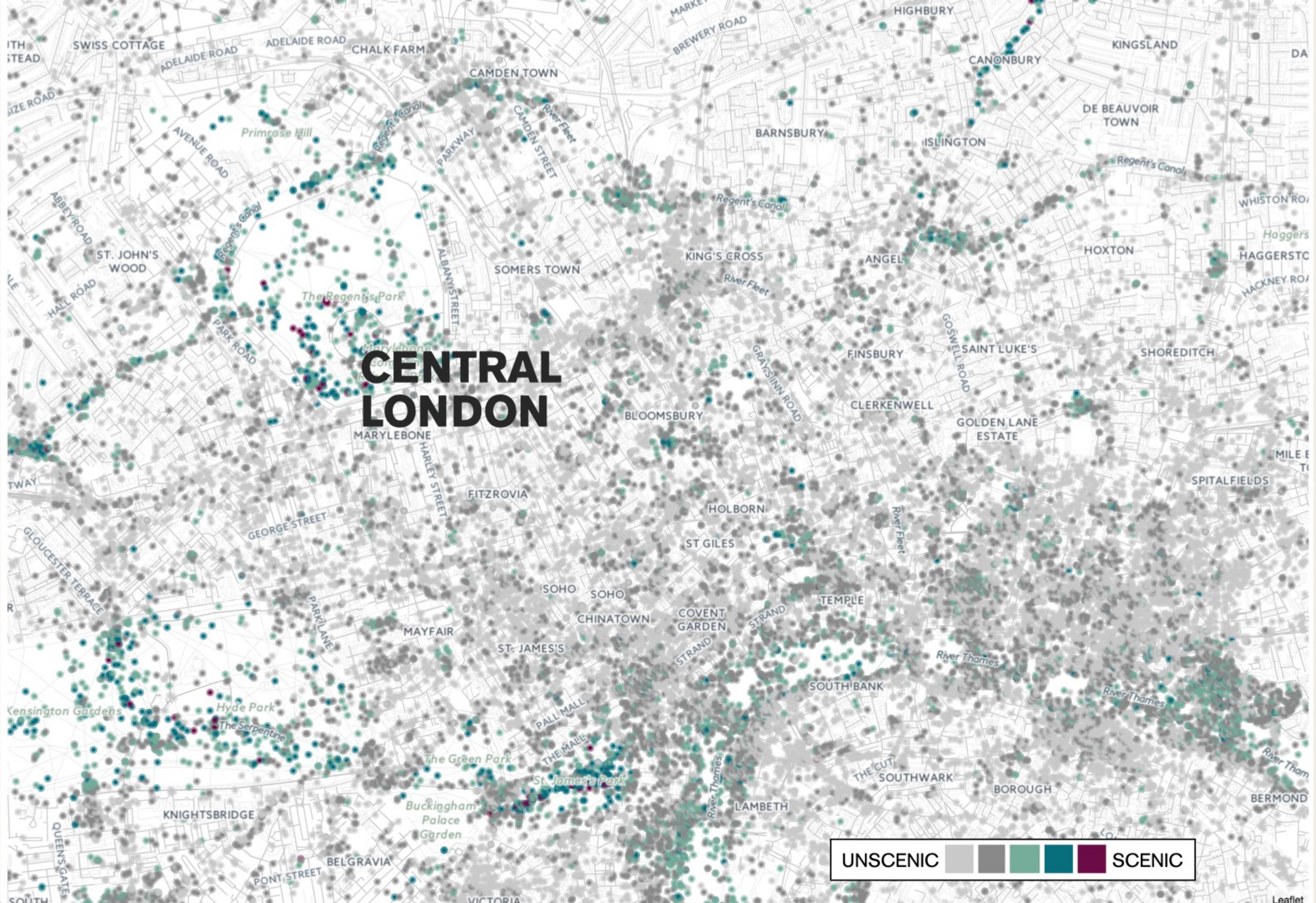


## Hampstead Heath Ponds

UNSCENIC      SCENIC



# CENTRAL LONDON





**Regent's Canal**

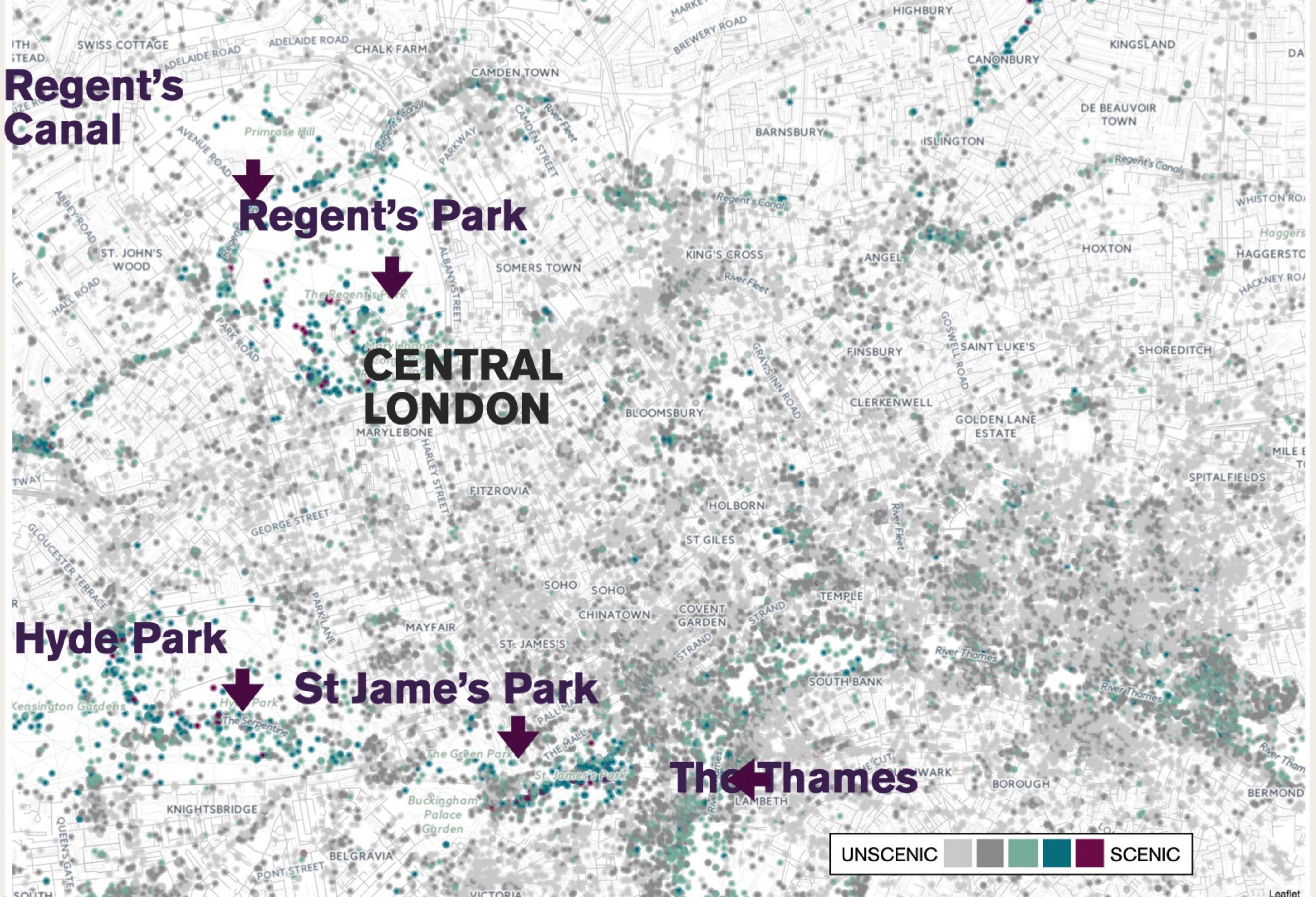
**Regent's Park**

**CENTRAL LONDON**

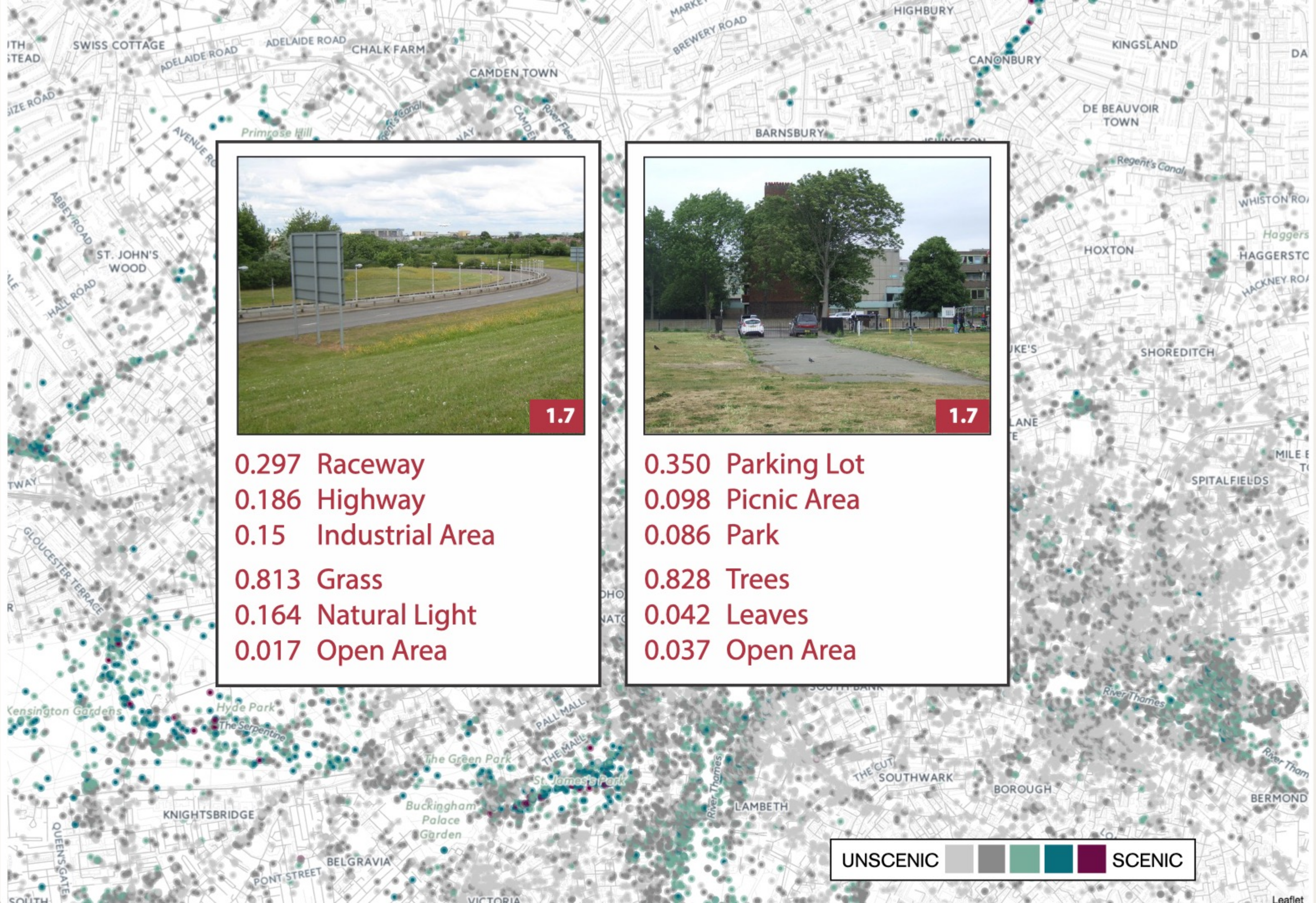
**Hyde Park**

**St James's Park**

**The Thames**







- 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



# TOWER HILL





- 0.501 Castle
- 0.103 Palace
- 0.099 Moat Water
- 0.997 Man Made
- 0.002 Open Area
- 0.001 Natural Light



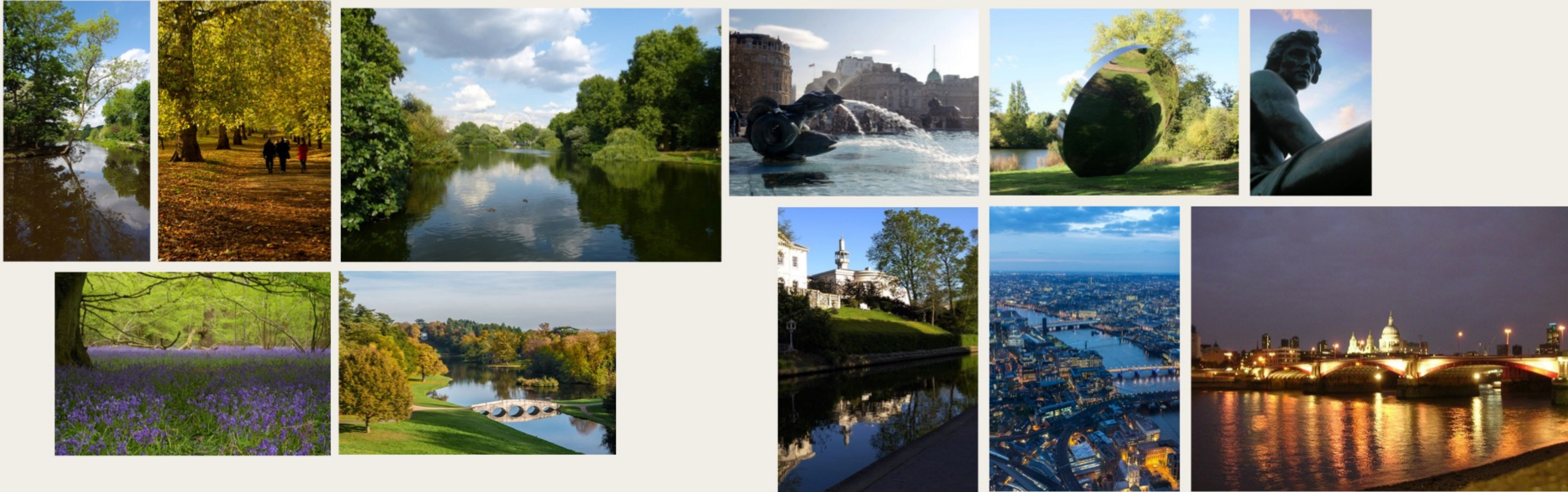
**Tower of London**

UNSCENIC      SCENIC



# Measuring Beauty with AI

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





# 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<sup>1,2</sup>, Tobias Preis<sup>1,2</sup> and Helen Susannah Moat<sup>1,2</sup>

<sup>1</sup>Data Science Lab, Behavioural Science, Warwick Business School, University of Warwick, Coventry CV4 7AL, UK

<sup>2</sup>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.



# Measuring Beauty with AI

The screenshot shows the Wired website interface. At the top, the Wired logo is on the left, and navigation links for Technology, Science, Culture, Video, Reviews, Magazine, and More are in the center. On the right, there are links for 'Follow' and a search icon. Below the navigation is a black banner with the text 'TAKE YOUR CITY.' and 'Live with the city. Play with the city.' with a Toyota logo on the right. The main article is in the Technology section, titled 'An AI has been trained to understand beauty'. The sub-headline reads: 'Artificial intelligence can translate languages and play games – now it's being tasked with understanding human subjectivity'. Below the headline are social media sharing icons for Twitter, Facebook, and Email. The author's name is LIAT CLARK, and the date is Wednesday 19 July 2017. The article features three images: a portrait of the author, a night sky with a meteor streak, and a promotional graphic for The Times newspaper subscription.

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Technology



## An AI has been trained to understand beauty

Artificial intelligence can translate languages and play games – now it's being tasked with understanding human subjectivity

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🐦 📘 ✉

  
By LIAT CLARK  
—  
Wednesday 19 July 2017





# BEAUTIFUL PLACES

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



Beautiful places enhance joy, community bonds, and economic prosperity, yet their quantifiable value is elusive. Beautiful Places AI bridges this gap, providing vital data to help enhance and preserve these spaces.



# 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.





# 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 research 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.



# 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**.

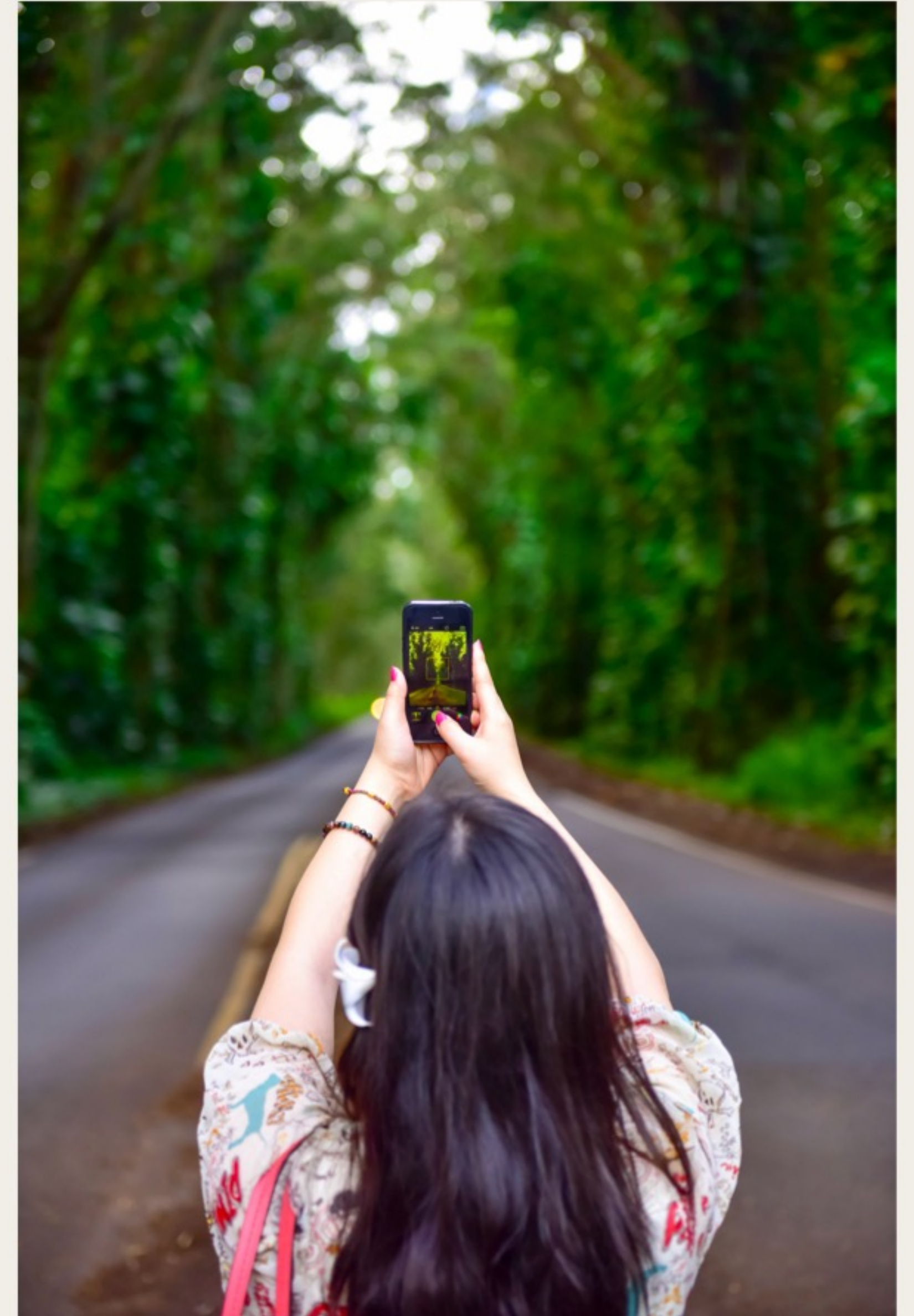




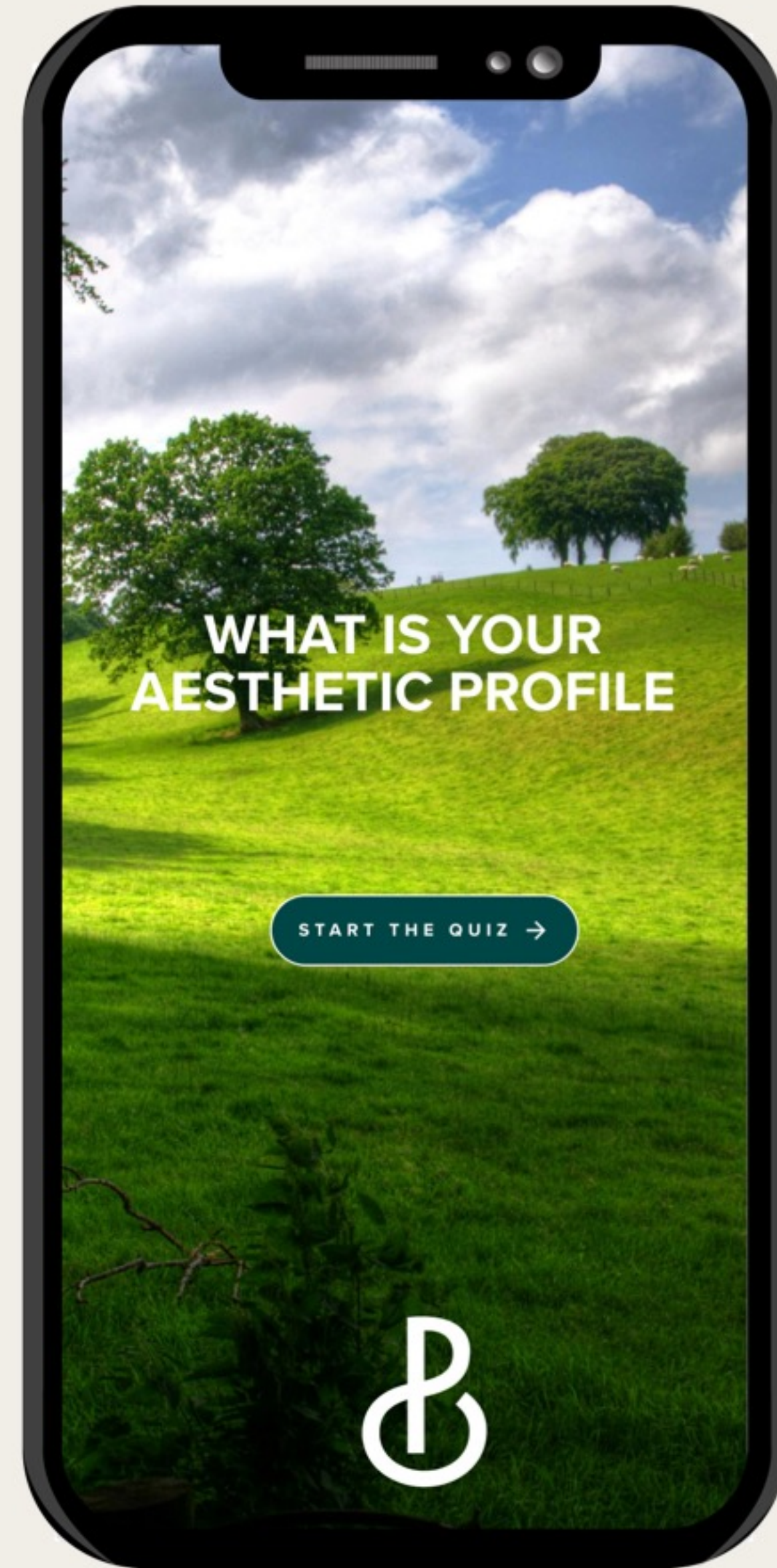
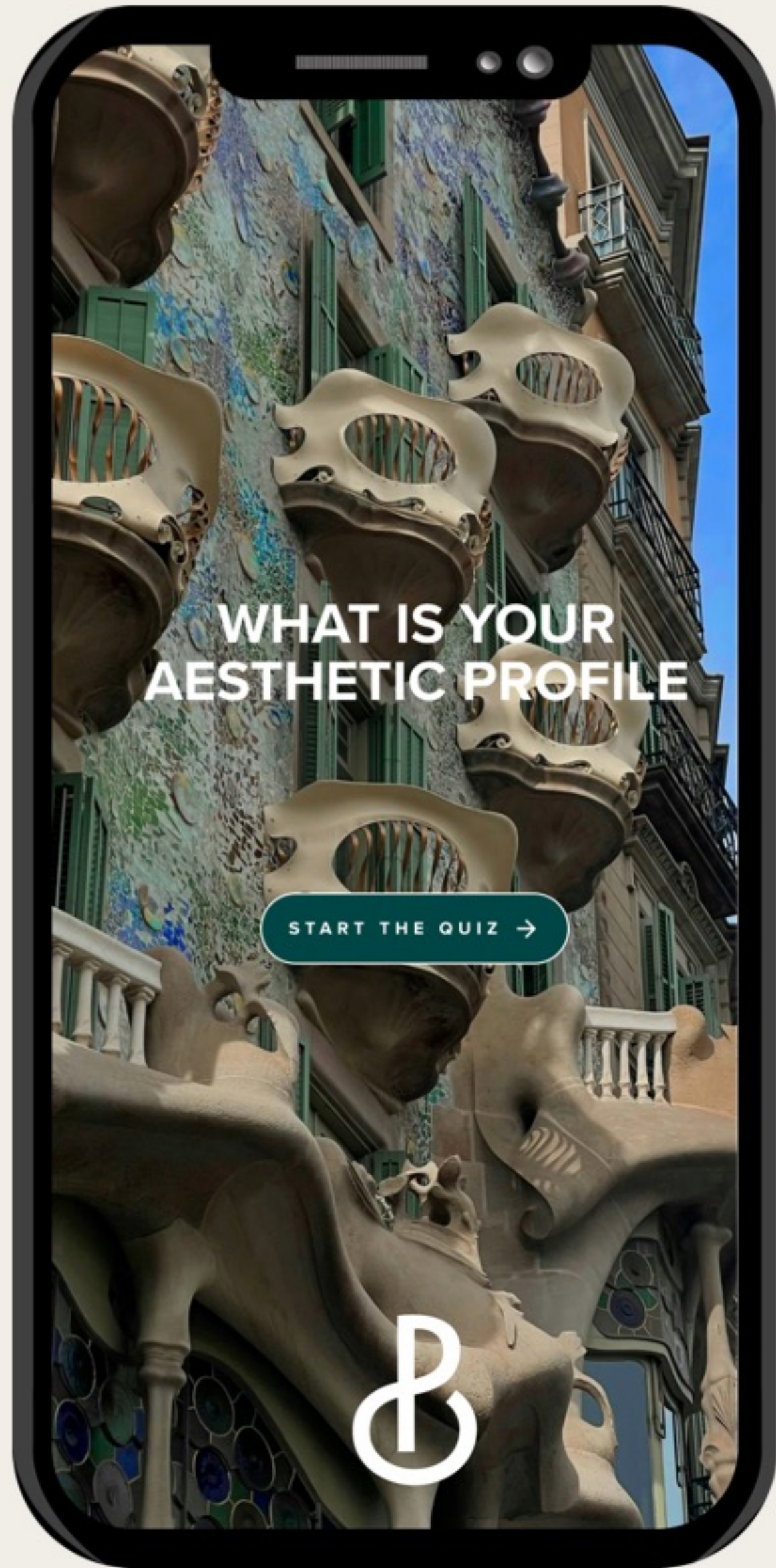
# 4

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**.

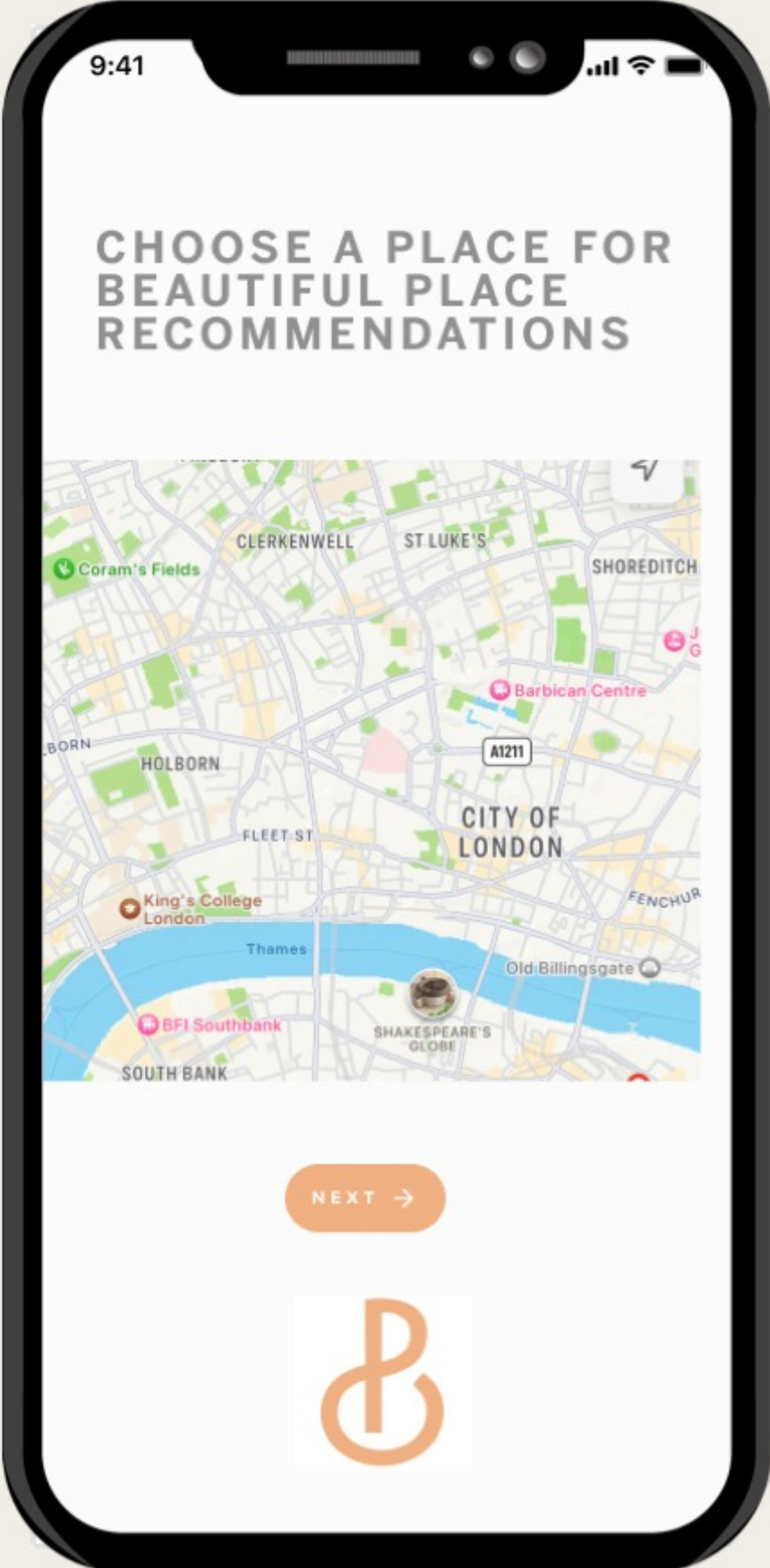
Envision an **app** guiding you to nearby **scenic gems**, anywhere in the world.













By harnessing the power of AI, we can make the beauty of the world more accessible to everyone, in ways we never imagined



# BEAUTIFUL PLACES

THANK YOU

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BEAUTIFULPLACES.AI