Why we want to build a machine that can predict a person's attractiveness

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It is an age-old question – what makes someone attractive? We often say things like "beauty is in the eye of the beholder" but while this romantic notion may bring comfort to those dealt a poor hand in life, it also gives

the impression that the foundations of attractiveness are elusive and unpredictable. It suggests that what each of us sees as an attractive trait – whether physical or psychological – is so variable that everyone must be looking for something different.

While there is variety in what each of us regards as beautiful, cutting through this noise are common and consistent preferences. Psychological traits such as a sense of humour, intelligence and kindness are generally sought after. Similarly, physical attributes such as waist-to-hip ratio (the difference in waist and hip circumference), sex-typical voice pitch (basically, our expectation that men will have deep voices, and women high voices), and facial symmetry are also reliably desirable. Finding someone who could take or leave *some* of these characteristics may be easy, but one would have a hard time finding someone yearning to meet a sour-faced, selfish and dull person who refuses to take a shower.

While researchers have taken steps to comprehensively catalogue the preferences of men and women, we still don't know which traits are the most important contributors to a person's attractiveness. What we do know is that not all attractive traits are preferred equally. This can be revealed using some basic psychological tasks, such as asking people to design a partner by allocating points to enhance their characteristics (similar to designing a character in a video game).

When given only a small points budget, tough choices have to be made – and some characteristics normally attractive in their own right tend to fade into the background. One study found that creativity and talents were trumped by the likes of intelligence and social status during the task. Interestingly, basic kindness tends to be one of the top traits when building the ideal long-term partner.

These tasks are great for assessing the individual traits that make up mate preferences. But they do not necessarily capture how people make

judgements about the attractiveness of living, breathing human beings. They may tell us that humour is important, for instance, but we balance a range of criteria in assessing attractiveness. A funny personality may seem less appealing in a person who is selfish.

Looking deeper into this, these tasks don't acknowledge the often complicated relationship between characteristics. For example, while the task might allow someone to design a partner who is low in intelligence but high in creativity, these attributes tend to go hand in hand in the real world.

This leaves us in the position where we know which traits are attractive, and have some idea of what preferences are prioritised over others. But by looking at different traits in isolation we are still missing the complete picture. Perhaps a better way to approach the problem would be to take an objective rating of a person's attractiveness (by asking the public to rate them on a scale, for example) and then figuring out what traits hold the most influence over that number.

Doing this would require taking a large sample of the population and measuring all the psychological and physical traits known to contribute to attractiveness. Then, by adding in objective measures of overall attractiveness – and a dash of machine learning – creating models capable of learning what traits matter the most.

This is not some science fiction idea – in fact it is something that my lab at Swansea University is currently crowdfunding. Machine learning is a powerful tool that has already accomplished feats such as predicting biological sex with a 93% accuracy based on brain scans alone. While we won't be scanning brains, we will be measuring dozens of our volunteers' characteristics – including humour, intelligence, impulsivity, facial symmetry, strength, and more.

In the first instance, we will use this information to calculate how these attributes combine to predict how one perceives one's own attractiveness. Then, we will extend this to predict objective judgements of attractiveness such as those made by the public after viewing online profiles of the volunteers.

This resulting model would be able to tell us that, for example, John's rating of "seven out of 10" by the public is primarily driven by his high intelligence, but held back a bit by his lack of muscle mass. It might also tell us that his poor sense of humour would normally work against him, but is completely overshadowed by his high social status. It would also tell us which traits don't really matter at all – that nobody really cares about John's lack of hair.

After calibration, such a model would also be able to predict the attractiveness of new cases – without the need for public ratings. In other words, it could guess how the public would rate someone's attractiveness, based on a small number of important traits.

Ultimately, this system could even be used to advise people on how they can make themselves more attractive to a wider range of people. One only has to look at the billions of dollars spent every year on make up and cosmetic surgery alone to realise that there is a great public interest in what people can do to enhance their attractiveness.

Some enhancements, such as taking guitar lessons or learning magic tricks for example, may at first glance seem like good methods of self-improvement. However, ultimately, these may pale in comparison to the attractiveness boost experienced by finding a better-paid job or – perhaps controversially – simply trying to be a kinder person. But to know for sure, we need a method to sort the wheat from the chaff. Which is why we want to build a machine that can predict attractiveness.