Introducing Polaris

Let's face it, the stats.

As of 2019, 1 in 4 elderlies are living alone in the UK. In countries like Japan and China, where I'm from, it's surprisingly common for an elderly to die alone undiscovered, being deprived of immediate help. In fact, this has become so widespread in Japan that they even have a word for it: Kodokushi.

What's more, research has shown that elderly living alone are more likely to attend emergencies and suffer from mental health conditions. [1]

Yet with our present state of technology and all the recent breakthroughs, like AI, we have everything we need to tackle this problem. Disappointingly, we haven't been offered with any satisfactory solutions yet, and I do believe this has to change, especially with the predicted shift of the population to the elderly end in the coming few decades.

Imagine a world where any elderly could easily ask for help just by voicing out, where a combination of technologies are able to give them a safer, warmer, easier, and less lonely life… This is Polaris, my Shell Project, a self-programed AI assistant.

It may not be the perfect product, but in essence, it's a demonstration of idea.

The Final Product

The final product is an AI assistant which you can download onto your computer. It has all the usual functions: e.g. time, weather, temperature, etc.

You can fully customize the way you use it: for example, I connect my computer to a small Bluetooth speaker, so Polaris taps into it and changes it into something like an Apple HomePod. You can then hang the speaker onto your neck, which comes in handy.

Polaris also has *one unprecedented function* that isn't available on any product you can find on the market

POLARIS

- Vincent Song's Shell Project

market. This is the emergency help function. Polaris listens to what the user says, and its AI recognises if one needs help. For example, if the user screams 'please help me', the emergency function will be initiated. After this, one will be given 3 seconds to reconfirm the request. No answer will be taken as a yes, because the user may be unconscious and fail to answer, which is often the case. After confirmation, the request will generate an alert on my online database, which can be accessed by local emergency services once Polaris is implemented in real life.

The alert will display information such as the user's age, address and name (which are previously saved on the database when they create their Polaris account) to facilitate the rescuing process. I expect this to benefit the many elderlies living alone.

Due to its target audience, Polaris seeks to be perfectly caring, human-like and user-friendly, and here are a non-exhaustive list of unique features that make it so:

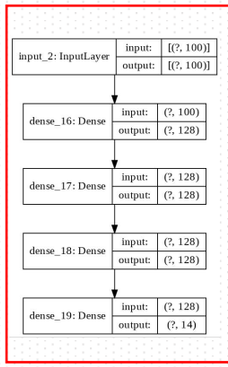
- It recognises whether you're asking it a question, or just talking to someone else — which means you don't have to say something like 'hey Siri' every time; just ask, it knows
- It uses your webcam to perform facial recognition with an AI that I programmed, designed and trained myself, so like a good friend, Polaris greets you.
- Instead of just forecasting the weather, Polaris also cares for you and gives you appropriate reminders, e.g. to wear more if it's cold
- You can customize nearly all aspects of your assistant through your account: its name, its voice, how it calls you etc.
- You can hold normal conversations with Polaris as well (something that's not much fun with Siri), which makes you feel less isolated
- Harrovians can also use it too! It's no fun creating something I can't use, hence I connected Polaris to the school calendar, so it informs you the upcoming events. Polaris can even filter out what forthcoming lectures there are!

[1] The association between living alone and health care utilisation in older adults: Dreyer, Steventon, Fisher, & Deeny, 2018

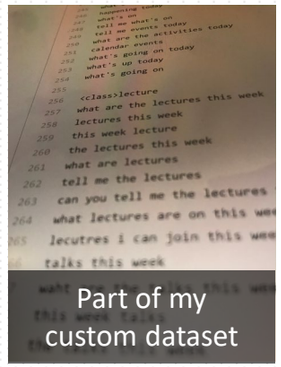
Development and Testing

Needless to say, I had to do a lot of programming. I programmed all aspects of Polaris, including all the database handling, question answering, and different AIs, except for the conversational AI, which I still trained myself. I designed, coded, and trained all the rest of the AI models myself on custom data.

At first, I used a feed-forward neural network for the AI that recognises user intent, but the AI overfitted on the data, so I had to expand my custom dataset. Then, after further testing, I completely reengineered its structure. The AI I use now is a bidirectional RNN using word tokenizations as input, which improved performance significantly. There were many other changes made throughout testing and development, but this was the most notable.



A visual representation of the AI used to classify user intent. This is one of the earlier versions, using a simple feed-forward neural network, which later proved inadequate for the task



Part of my custom dataset

How Polaris Compares

Sure, in terms of elderly help there are many solutions on the market right now, but nearly all of them involve active user intervention. For example, elderly in the UK who live alone are given a small button which they can press to call for help, but they have to be able to answer the call, which many don't. This sort of problem does not occur with Polaris.