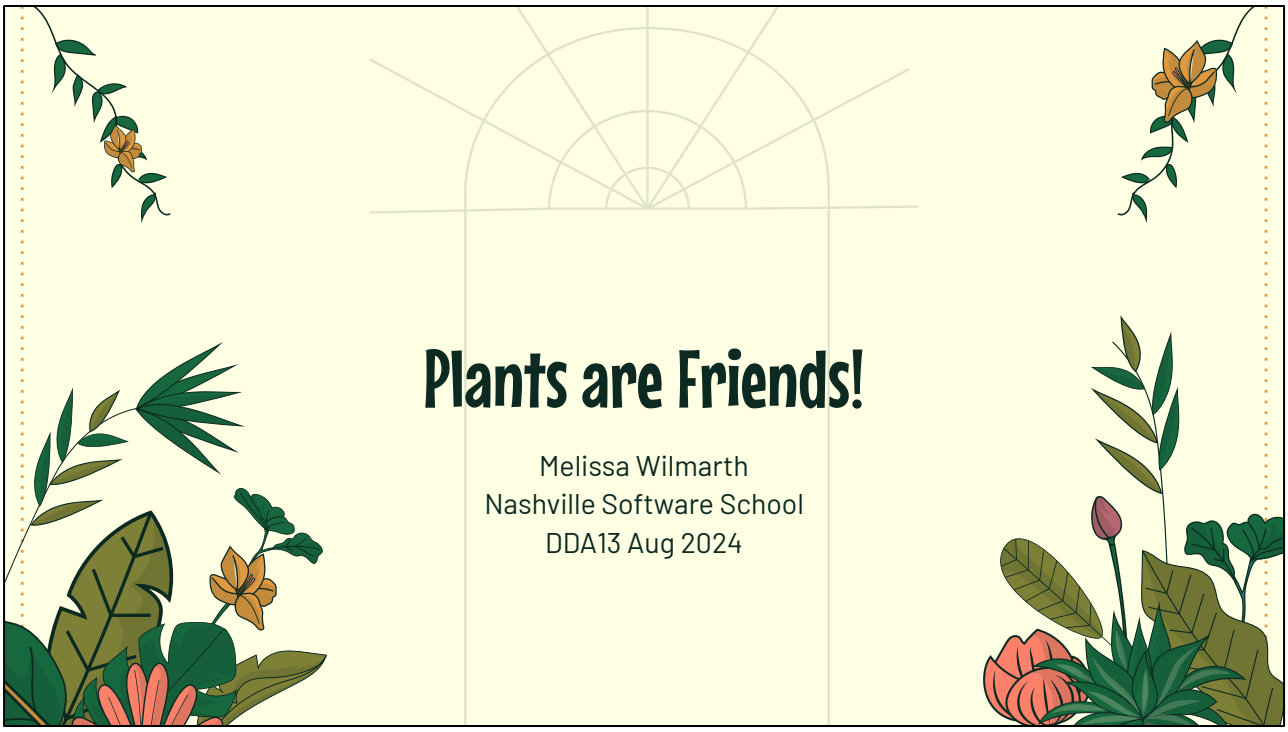


Thank you for watching my capstone presentation on houseplants. Why houseplants?

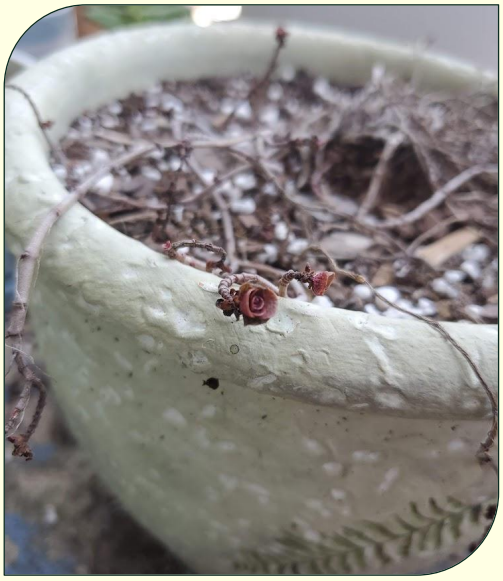
Increased Happiness

Horticultural therapy has shown to improve mental health conditions such as anxiety, loneliness, and depression [1]

Increased Productivity

A review of studies between 1996 and 2017 found between 6-38% increase in productivity when an office had plants [2]

Studies, such as the two mentioned here, have shown that houseplants increase happiness and can even improve productivity.



Rosencrantz the Red Dragon's Blood Succulent (deceased)

The Burden of Choice

Few people do not know the disappointment of adopting a houseplant only to have it die.

Water, light, and soil conditions can all affect your new friend.

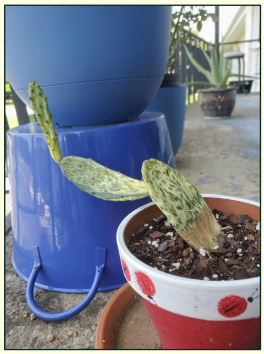
Maybe you just need to choose the right plant, but how? There are so many to choose from!

So, plants are good, but how do you choose? Even the most experienced plant parent knows what it's like to fail a plant.

Plants have needs

Soil, Light, and Water Needs

Soil	Light	High	Low	Low to Moderate	Moderate
Chalk, Clay, Loamy, Sandy	Bright, Indirect Light			4	
	Full Sun		1		
	Full Sun to Full Shade				1
	Full Sun to Part Shade				1
	Part Shade				1
	Part Shade to Full Shade				1
Chalk, Loamy, Sandy	Full Sun to Part Shade		1		
	Part Shade to Full Shade				1
Loamy	Bright, Indirect Light		1	42	
	Full Sun		2	13	1
	Full Sun to Full Shade			1	
	Full Sun to Part Shade	1	2		1
	Part Shade	1	1		2
	Part Shade to Full Shade	1			1
Loamy, Sandy	Bright, Indirect Light		1		
	Full Sun		50	3	3
	Full Sun to Light Shade		9		
	Full Sun to Part Shade		55	10	2
	Part Shade		3		1
	Part Shade to Full Shade				2
Orchid or Bark Mix	Full Sun to Part Shade	1	1		
	Light Shade to Part Shade		1		
	Part Shade				4
Sandy	Full Sun		1		
	Full Sun to Part Shade		3		1
	Part Shade		1		1
	Part Shade to Full Shade				1



Pickles the cactus

Cactuses need a lot of light, right?
Well yes, but not direct light!

This is because plants have complicated needs just between soil, light, and water!

For example, Pickles the cactus on the right was given to me by a friend in the hopes that I could save him. Assuming, since he is a cactus, that he needed bright full sunlight, I placed him in the sunniest spot I had. Unfortunately he continued to decline until I bought the plant on the left which also needed full light. As you can see I was careful not to block Pickles' sun with the other plant, but that is exactly what he wanted! Pickles grew into the shade of the other plant because cacti need bright *indirect* sunlight.

If even a cactus can be difficult to intuit the needs of, how does one choose the proper plant?

Violet's House of Plants

Violet is opening a plant shop staged as a house with different levels of light in each "room" so that her customers can choose a plant based on the room it will be placed in their own house

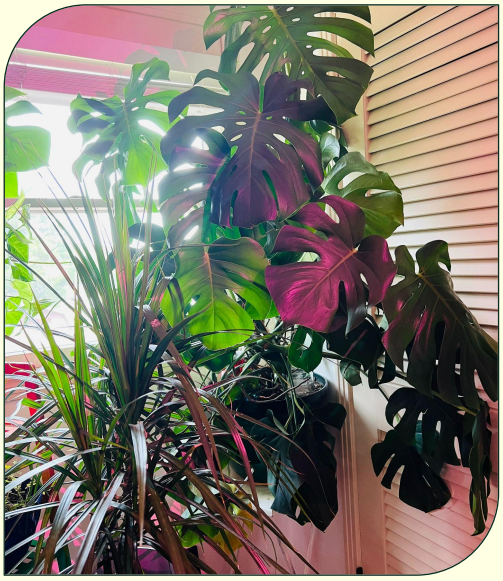
- **Patio/Balcony** - Full sun
- **Living Room** - 50-75% minimum light, low to moderate watering
- **Office** - 50-75% minimum light, neglect tolerant
- **Kitchen** - 50-100% minimum light, high maintenance, high water
- **Bedroom** - Low light, neglect tolerant

Minerva

Well the truth of it is that there is no guarantee even if you choose wisely. However, what if a shop at least made it easier?

This hypothetical plant shop, owned by Violet, will be set up to mimic different conditions that a houseplant might encounter.
Therefore you, the customer, can simply go to the room in the store which best fits the room in your house or office to select a plant.

Shown are the general conditions for each room.
For example an office plant would need to be neglect tolerant, in case the one person watering goes on vacation or in the case where everyone assumes someone else is watering it!



June the Monstera

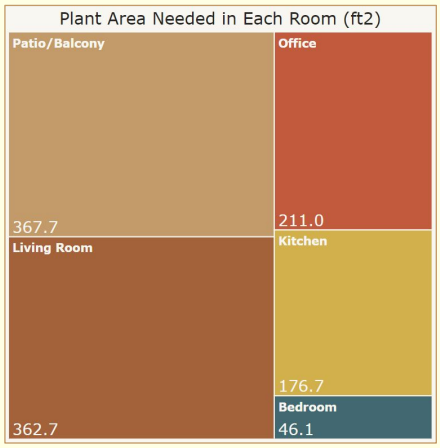
Analysis

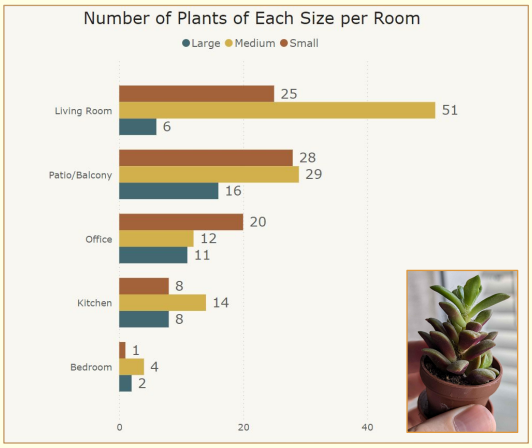
Violet would like the following:

- How much room is needed for each room
- How much of each soil type to order
- How much of each soil mix to make
- How many “Toxic”, “High Maintenance”, and “Tolerates Neglect” signs to order
- How many of each pot size to order
- A tool to help customers search for plants

The analyses Violet wants to open her shop are:
How much room will be needed for each room so she can start scouting locations
How much of each soil type to order and how much of each recipe to make.
How many Toxic or High maintenance signs, and pots of each size to order
A tool to help customers or staff find plants that will be a good fit for them

Plant Area Needed

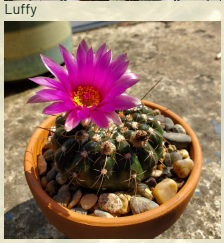




So first we have how much area is needed for each of the rooms.
We have the relative area of each room with a rough estimate in square feet on the left and how many of each size of plant will be in each room on the left.
With this Violet can start scouting possible locations as well as know how many of each size of plant shelves will need to fit in each room.

Soil

Luffy


Stacy

All plants need well-drained soil

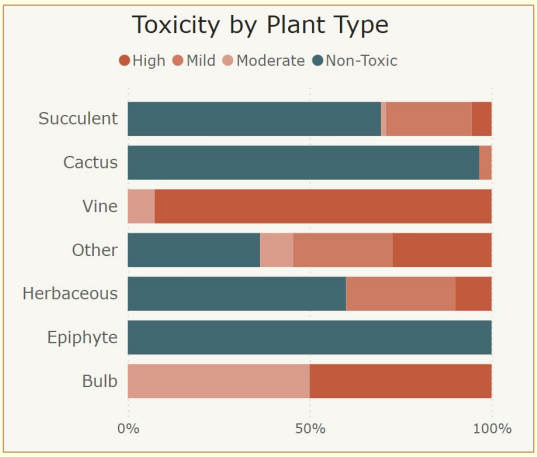
Well-drained does not mean dry, some soils hold water better than others and will remain moist but not soggy. Some plants will need soil that not only drains well but also dries out. Epiphytic plants prefer practically no soil at all!

Soil Recipe	Loam	Sand	Chalk	Clay	Bark	**Total to Mix**
Loam	24					**24**
Sand		2				**2**
Loam, Sand	21	21				**42**
Chalk, Loam, Sand	0.5	0.5	0.5			**1.5**
Chalk, Clay, Loam, Sand	2	2	2	2		**8**
Orchid or Bark Mix					1.5	**1.5**
Total to Purchase	**47.5**	**25.5**	**2.5**	**2**	**1.5**	**79**

In the meantime soil can be sourced.
All plants need well drained soil. If they need soil at all. On the top left is an air plant that needs no soil at all!

For the rest of the plants we have the calculations for how many cubic feet to buy for each type as well as the amount of each recipe to mix up in order to pot each plant. This is calculated with a slight over estimate so that any extra can be sold as custom soil mixes alongside the plants.

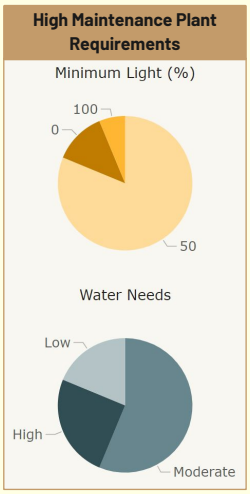
Total Toxic Plants: 86



June the Pothos (Toxic)

Many customers will be worried about toxicity because they have small children or pets. While some types are predictable in their toxicity, others are not. For example, all vines and bulbs in the shop have some amount of toxicity and all Epiphytes offered are non-toxic. However, the other types are mixed which means the 86 signs for toxicity will need to be easy to stand out.

High Maintenance Plants: 16



Botanical Name	Common Name(s)	Light	Water needs
Neoregelia carolinae	Blushing Bromeliad	Part Shade to Full Shade	High
Guzmania lingulata	Droophead Tufted Airplant, Orange Star plant, Scarlet Star, Vase Plant	Part Shade	High
Guzmania musaica	Mosaic Vase, Guzmania	Full Sun to Part Shade	High
Ananas comosus	Pineapple, bananas, pina	Full Sun to Part Shade	High
Lithops	Living Stone, Pebble Plants	Full Sun to Part Shade	Low
Wallisia Cyanea	Pink Quill	Light Shade to Part Shade	Low
Lithops pseudotruncatella	Truncate Living Stone	Full Sun to Part Shade	Low
Saintpaulia ionantha	African Violet	Part Shade	Moderate
Kalanchoe delagoensis	Chandelier Plant, Mother of Millions	Full Sun to Part Shade	Moderate
Vriesea splendens	Flaming Sword Bromeliad, Vriesea	Part Shade	Moderate
Ananas comosus var. variegatus	Ivory Pineapple, Variegated Pineapple	Full Sun	Moderate
Phalaenopsis amabilis	Moon Orchid, Moth Orchid, Phalaenopsis Orchid	Part Shade	Moderate
Disocactus ackermannii	Orchid Cactus, Pond Lily Cactus	Part Shade	Moderate
Neoregelia spectabilis	Painted Fingernail Plant, Fingernail Bromeliad, Fingernail Plant, Marbled Fingernail, Miniature Marble Plant, Painted Fingernail Bromeliad	Part Shade	Moderate
Platycerium bifurcatum	Staghorn Fern, Common Staghorn Fern, Elkhorn Fern	Part Shade to Full Shade	Moderate
Peperomia argyreia	Watermelon Peperomia, Watermelon Begonia	Part Shade	Moderate

In case someone wants a challenge, there are 16 plants that require high maintenance relative to the other plants in the shop. This was determined based on how much watering they needed as well as how finicky they were about when and how they got that water.

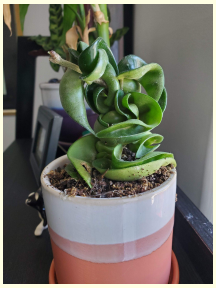
Other factors about care were also considered such as “odd” behavior. Lithops may have low water needs, but the old leaves will shrivel and die as the new leaves grow which can lead someone to conclude that the plant is dying and needs more water. This can result in overwatering and the plant *actually* dying.

All of these are destined for the “Kitchen”, to make it easier for the staff and because this room is more frequented in most homes. The two pies show the distribution of light and water needs for these high maintenance plants.

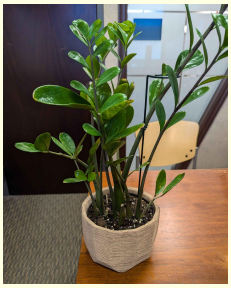
Vernon "Verny" the Fern

Neglect Tolerant: 196

Drought tolerant and low maintenance plants make for great office and beginner plants.



Steve



Aaron

Next we have our plants that are the opposite, those that tolerate neglect. This is based mostly on whether or not the plant is drought tolerant, even if they generally prefer moderate watering.
83% 196 of the 235 plants in Violet's shop fit this description since it is predicted to be the most popular category.

Dashboard: find some plants!

Plant Finder Dashboard

From left to right: Morticia, Hai, Pickle, Unnamed, Dumbo, Nessie, Sheldon, Rapunzel

Now that we have all of our supplies, lets take a look at a tool to help customers find plants!
Click the link in the slide or navigate to here:
https://app.powerbi.com/view?r=eyJrIjoiYjAzOTc4ZjEtYjAwNi00ODhjLTgyOTUtYTE3NThmMGM1MmRhIiwidCI6IjEwMWRhNTg3LTE4NDMtNGY1Mi04YjhhLTE3YjA2OWM2NmQzMyIsImMiOjJ9

There are four pages to the dashboard which include

- A plant finder based on conditions which lists the plants in the store that meet those requirements as well as the “room” to find them in
- A care card generator, once a plant is chosen, the customer can generate a care card to send with the plant if it is a gift or to keep for their own use
- An inventory and supply tracker that, once sales have started, can be used to track inventory and set par levels at which to order more
- A plant monitoring dashboard. If new plants are added to the shop, this page can monitor the distributions across “rooms” (conditions) and toxicity

Thank You!

Technology

- Python - web scraping, data cleanup
- PowerBI - visualization and interactive dashboard

Data Sources

- https://www.gardenia.net/
- https://houseplantsexpert.com
- https://brainygardener.com/

Articles

1. de Seixas M, Williamson D, Barker G, Vickerstaff R. **Horticultural therapy in a psychiatric in-patient setting**. BJPsych Int. 2017 Nov 1;14(4):87-89. doi:10.1192/s2056474000002087. PMID: 29093958; PMCID: PMC5663021.
2. Ostner, S. W. (2021). **Biophilia hypothesis: The benefits of nature in the workplace**. In R. Appel-Meulenbroek & V. Danivska (Eds.), A handbook of theories on designing alignment between people and the office environment (pp. 169–180). Routledge/Taylor & Francis Group. https://doi.org/10.1201/9781003128830-15

Harry the Aloe that Lived

Thank you for taking a look and hope that this tool is helpful on your plant parent journey!

Technology used was python for webscraping and data cleanup, some manual filling in of gaps in Excel and PowerBI for visualization and the interactive dashboard.

Web sites scraped were mainly the first two and gaps filled in with the third.

Two articles mentioned at the beginning showing affects of plants on happiness and productivity.