Project Design Phase-I
Problem – Solution Fit Template

Date	19 September 2022
Team ID	PNT2022TMID22043
Project Name	Project - A Novel Method for Handwritten Digit Recognition System
Maximum Marks	2 Marks

Problem

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) — CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

Customer who deal with handwritten digits like banking sector, schools, colleges, railways, firms, etc…

6. CUSTOMER CONSTRAINTS — CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

Unclear images will not give accurate results.
Network connectivity issues may occur

5. AVAILABLE SOLUTIONS — AS

Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

Traditional systems of handwriting recognition have relied on handcrafted feature and a large amount of prior knowledge.

There are no widely used software's to detect handwriting; instead, they check with other people to affirm what number it is.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

People can struggle to read others' handwriting. The handwritten digits are not always of the same size, width, orientation as they differ from writing of person to person, so the general problem would be while classifying the digits.

Process getting slow to recognize the digits.

Time taken to scan and upload images is slower

9. PROBLEM ROOT CAUSE — RC

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

The need to develop a handwritten digit recognition system arises due to illegible handwritten digits. Every human has different way of writing style, the numbers from 0 to 9 are different in structure. Sometimes it takes time to understand the digit written in bank cheques and post mail services. When a digit is recognized wrong, it may result in trouble. This causes the need for handwritten digit recognition system.

7. BEHAVIOUR — BE

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; Indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

Directly related:
Designing the best software to detect digits accurately in an efficient manner.

Indirectly associated:
To address the problem, they can take a snap of the handwritten digit and upload it in the software

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS — TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

Not able to guess the digits sometimes.

4. EMOTIONS: BEFORE / AFTER — EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.
BEFORE:
To detect any handwritten digits from various sources is quite difficult. Photographs, papers and touch displays and classifying them into ten specified categories 0-9 is difficult.
AFTER:
The use of in-depth learning methods, human efforts can be reduced. Low confidence on guessing the digits

10. YOUR SOLUTION — SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

A novel method for handwritten digit recognition system helps in recognizing the handwritten digits that uses MNIST dataset for training the model.

The model gets the image of the handwritten digits and recognizes the handwritten digits.

CNN algorithm is used over the MNIST dataset to recognize the handwritten digits.

8. CHANNELS of BEHAVIOUR — CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

Using software that is available on the internet.
Obtaining assistance from those nearby in order to recognise the digits written by their customers.

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

A complete offline application built using python libraries that uses a neural network in order to predict the digit drawn over screen. Modules Tensorflow for neural

Extract online & offline CH of BE