**Project Title: A Novel Method For Handwritten Digit Recognition System Project Design Phase-I Solution Fit**

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Define CS, fit into CC

**1. CUSTOMER SEGMENT(S)** CS

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

Organizations who want to recognize the handwritten digits of people
Example:
✓Post office,

✓Data entry offices,

✓Forensic Departments.

**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.

In mobiles and laptop, there are possibilities for lack of stable internet connections and unavailability of devices. It is hard task for the machine to recognize the handwritten digits which are not perfect.

**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 note taking.
Already there are existing solutions available for handwritten
recognition. But, most of them are inaccurate.
The solution proposed by our system has more accuracy
and it is efficient in recognition of manually written digits.

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.

Jobs to be done: To identify the digits in the manually written forms,

Cheques filled by people in banks,

Phone numbers written manually in register notebook of hospitals.

Problems: Dim lighting and weak eyesight

**9. PROBLEM ROOT CAUSE** RC

What is the real reason that this problem exists? What is the backstory behind the need to do this job?

i.e. customers have to do it because of the change in regulations.

Handwritten digits are in different fonts and sizes, hard to recognize the digits due to various factors such as dim lighting, weakening eyesight.

**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)

customer wants available devices with stable internet connection and quality cameras.

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.

Advertisement in the market about the efficient recognition of digits.

Articles about the achievements made by our project.

### 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.

Defects are common and our project is not an exception

When the system failed to recognize the digit,

Customer Mentality:
Before:(Failure)
We would give guarantee that it would work most of the time
and if any error occurs, they can contact us at any time.
So, customers can feel at ease.
After:(Failure)
They have no need to panic when the failure occurs
They can easily contact us to rectify the error.
We would solve the defect as soon as possible.

### 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.

Our solution aims to recognize handwritten digits using machine learning techniques thereby saving costs to the organization improving employee productivity.

In our model we use AlexNet , which is one of the CNN architectures . AlexNet allows for multi-GPU training by putting half of the model's neurons on one GPU and the other half on another GPU. Not only does this mean that a bigger model can be trained, but it also cuts down on the training time. It also reduces the overfitting problem by Data Augmentation and Dropout.

### 8. CHANNELS of BEHAVIOUR

CH

#### 8.1ONLINE

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

Requires Stable internet connection for image processing.

#### 8.2 OFFLINE

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

Obtain modern electronic devices and check they are working

Identify strong TR & EM