

Idea: Research Intelligence (R.I)

A technology using A.I to empower people (especially blind or visually impaired people) to pursue research. A novel architecture to build a neural network with the capabilities to observe, understand and work for solving the problems in the environment using the resources of the same environment (a key idea that humans apply in research i.e., to fine-tune and apply a successful idea of one domain into another for example, convolutional neural networks are inspired from the working of the human eye). The idea is to build an end-to-end deep learning model with novel (under research) architecture that enables the machines to observe, understand society, and reason, think, invent, re-invent the solutions to various problems of the society accurately by applying the concept of “Cross-domain knowledge transfer” so that these models can aid people especially the blind or visually impaired to contribute in advancements of research breakthroughs. This technology can also aid normal people to do active research with less time and investment.

Brief Introduction:

Building A.I model as creative and innovative as humans are, is one of the long-standing problems in the field of A.I. Humans have an ability to think, reason, and analyze information by nature, which we take for granted but it's an opposite case to inculcate the same in machines. The idea is to use a completely new architecture that is different from the existing architectures to build A.I model that makes the research work easier, sensible and helps even the blind or visually impaired to pursue research and find breakthroughs. The plan is to take these models after building, to assist people. The ultimate aim is to bring in innovative nature in machines via a better understanding of data.

History:

The birth of this striking idea is from the quote by a great British statistician George box on models. The ultimate moto of the idea is to build a useful model to aid every field in research.

“All models are wrong, but some are useful [edit: which can be trusted]”-Statistician George box

Inspiration of the idea:

The blind or visually impaired students who face difficulties in conducting various science experiments without an attendee or find tough time to understand a complex research paper on science, math, statistics or deep learning alone so, they can be helped by the research intelligence technology (R.I) that uses A.I to make the task easier. Different smart A.I models in R.I (research intelligence) application like computer vision, NLP helps the people by describing a research paper or any other tasks to ultimately reduce the effort and increases the productivity. This helps to build a better working world for all blind and impaired people that lets them contribute to advancements of their liking.

Approach towards building a better working world:

The idea can aid the research advancements that help to solve problems in various fields especially medical, education, technology. The idea can build a better working world by enabling the people (blind or visually impaired) to get a chance to pursue research of their choice so that they will be able to contribute to faster advancements in various fields. The key concept of the proposed idea can also be transferred into various other domains of computer vision such as object detection to reduce the catastrophes that happen because of the incapability of the model to generalize in autonomous cars.

Objectives of the Idea:

1. Build an algorithm to aid disabled people to pursue research of their choice.
2. Extend the domain of computer vision to make models with the ability to not only find patterns but also to analyze the data more cautiously and bring out useful insights.
3. Ability to make and generalize computer vision applications and aid self-driving research.

Impacts of the Idea:

1. Making models to understand data analytically can make object detection, Check detection, Document Intelligence more trustable and minimize the errors that happen.

2. Aid the blind people or visually impaired to better understand the environment by the better speech description of the world to the person by A.I model with novel architecture.
3. Aid the medical field in identifying pathology in various medical scans, images much better that helps to reduce medical errors.

The Industry drivers:

1. Performance of the model in real-world that's built based on novel architecture.
2. Capability of the model to generalize the task and perform well on unseen data with a scope to transfer the main idea into other sub-fields of computer vision such as object detection in self-driving cars.
3. Attentive monitoring of model's performance post-deployment.
4. Experienced Research teams and a team of technical engineers to boost the model's enhancement research after releasing the first version.

Potential Competitors (Global tech giant's research subsidiaries):

1. Google's brain team, Google's Deep Mind.
2. Meta's Artificial Intelligence lab.
3. EY's D.I (Document Intelligence), T.A.I (Trusted A.I) research teams etc.

The uniqueness of My Idea:

A.I has been everywhere, its application belt is very broad and efficient. Already most of the fields have a positive impact by A.I but still there is good scope to apply A.I. Now A.I is used to aiding blind people to walk alone without a stick or pet dog such as "Seeing A.I" that helps to make blind people understand the world around. Extending this great effort, I would like to assist the blind or visually impaired with A.I model to pursue research efficiently.

High-Level Implementation & Executive Plan:

The procedure to achieve the aim of the idea i.e., to help blind and impaired people is a tough and expensive task. The main and tough tasks of the whole process from planning blueprint to deployment are first, collecting and labelling the data (The better way would be to collaborate with a tech company to offer useful data instead of collecting data from scratch as it would take years to fulfil the basic thirst of neural networks) secondly, implementing the model with robust architecture that satisfies the needs. The process of the idea is covered under “Initial Investment”.

People: There is a basic need of 5-10 teams to work on the idea and build it efficiently. Minimum of 2-4 teams need to be research teams that work on Machine Learning part of the idea and 2-3 teams to work on the technical part such as developing the websites, front end, back end, friendly user interface, 1-2 teams need to work on an executive side, 1-2 teams work on technical assistance to executive team like Marketing, poster making, graphic design etc.

Note: The above-mentioned implementation requirements are basics to carry out the research, building model, promotion all together simultaneously to make the application available in less than a year. According to me, the efficient approach towards achieving the goal as a startup is with a single small team of five members and take pieces of tasks in the process i.e., starting with research work, building a model to promotion, and work on one at a time to build the application with a smaller team and without compromising on performance.

Technologies Required:

1. There is no requirement of funds to avail development technology services since open source software like TensorFlow, Python, ReactJS, Git, and other data science packages fulfil the need.
2. Cloud service provider subscription such as AWS is essential to host the application and make it available in various popular app stores for download.

Initial Investment:

In order to build the first version of an application, there is a huge need of funding for various steps in the process for achieving the final product apart from payroll.

Process in Development phase:

1. Data collection: This step needs a huge portion of funds to accomplish compared to the rest of the steps in the process as collecting data and preparing it to train the model on this specific task requires lots of time, effort.
2. Research and Finalizing an effective model for novel application: This step needs a moderate fund's portion to accomplish. There is the requirement of one team, at least 3 in size to work on developing architecture and build the model with the finalized architecture.
3. Build the model with deep learning frameworks like TensorFlow or PyTorch.
4. Train the model with fine data, run basic tests.
5. Implement Final broad-scale tests to check efficiency and accuracy. Start marketing, promoting activities.
6. Deploy the application, gain users and provide quality customer care.

Note: The overall estimate fund required cumulative of all steps including any external unexpected cases would be close to \$62,000.0.

A table regarding the fund required for different needs of initial stage of project development is available in the google drive link:

<https://docs.google.com/spreadsheets/d/1optgi30H4INHGIN0Jb7lcCE-zQ4vBUFd/edit?usp=sharing&ouid=108348726345693761009&rtpof=true&sd=true>

Financial Projections of initial years:

The financial projections and goals of the idea are crystal clear. The plan to grow the application after getting ready the first version is to incorporate generalizable architecture extension into the model that allows the network architecture to be widely inspired into other domains including computer vision, medical image A.I etc.

Revenue:

The source of revenue would be the advertisements, subscriptions, and tie-up company services to use the service as default in their product such as making it default with all Android phones. There is still a good scope to have better options for revenue but for now, these are the main on the table.

The average revenue expected to be raised after releasing the project would be close to \$70,000 in the span of first-year which increases eventually to \$2,50,000 by 3 years.

Operating cost:

The idea is a tough one to build however, the operating cost of the application might be less than any other similar kind of application from different companies. The estimated operating cost to maintain the application running and providing unparalleled services to users would be \$55,000 appx including cloud maintenance. The data collection expenses are only in development, after releasing the service there is no need for money to spend on data.

Operating Profits:

The estimated operating profits on releasing the product really depends on real-time working and the range of reach of the product. It is not an advisable idea to come to an estimation of operating profits before understanding the first impression of the product in targeted users. The minimum expected operating profits should not be less than \$15,000*.

*For the initial years of service, later a drastic change towards \$80,000 is expected by following proper executive plans within 3 years span.

Status of Architecture:

The idea of novel architecture that I have mentioned above has lots of complexities in designing due it's a completely new genre of application (help blind or visually impaired people to pursue research and education). The design process is in progress and below is the summary of the status and the future research to end up with final architecture.

Steps and their status of design:

1. Data Interpretation to Neural Network: Interpreting data to neural networks is one of the tough tasks especially unstructured data however, many architectures like Convolutional neural networks were invented to solve this problem. The problem, in this case, needs a novel way to represent image data to neural networks such that they could better understand data more analytically. The idea of framing data into spatial slices was developed to better interpret the data. My research paper on better interpreting unstructured data to neural networks is presented at Machine Learning Developer Summit 2022 with the paper titled "Information Preserving Frame-based Image Interpretation".
Status: done
2. Modelling a novel Architecture: This is one of the finest steps to take care of, to make the model better. The modelling part of the idea is under research, hopefully, I can conclude and go for publishing the paper in the early 2022's. **Status: Experiments going on**
3. Integrating the above two portions: This is a relatively easy task that can be done with little care once the research for architecture building is done. The plan is to make use of the frame-based image interpretation of the data proposed in the above-mentioned paper to train the deep learning model with appropriate architecture, once the architecture is ready.