trained ResNet-50 model image encoder, it combines a 1D CNN to encode a sequence of information for extracting region-based visual features. This model performs on the BengaliLekhaImageCaptions dataset consisted of 9,154 images. Jishan et al. [5], proposed a hybrid model that uses CNN as an encoder, the result of which is sent to a bidirectional LSTM that decreases the computational complexities without trading off the exactness of the descriptor. To generate an image descriptor in Bengali, a Bengali dataset was created named as Bengali natural language image to text (BNLIT) dataset. Recently, a work regarding Bengali video captioning was done by Raj et al. [11]. Here an encoder-decoder-based deep architecture was proposed that incorporates a combination of different CNNs, like 2D-CNN and 3D-CNN with BiLSTM as the encoder and two-layer LSTM as the decoder. *(812 words).*

7. Objectives and Possible Outcome: *(100-200 words)*

Objectives: The aim of the proposed project is to generate Bengali text description from short videos through video captioning. The aim can be divided into several objectives which are presented below:

i. To identify a suitable attention model to steer attention towards appropriate Spatial-temporal locations in a video in video captioning system.
ii. To integrate Convolution Neural Network and Long Short-Term Memory to train and generate Bengali description from videos.
iii. To determine the performances of the proposed algorithm by comparing the results of existing algorithms.

Possible Outcome:

i. A Bengali video captioning system using deep learning technique with attention mechanism
ii. Bengali caption of short videos generating from the trained model
iii. Performance determination from the comparison of proposed model with existing ones. *(125 words)*

8. Research Methodology: *(400-800 words)*

This study will be initialized with a further study on background and literature review to gain a deeper understanding of video captioning, its unexplored sectors, recent problems, and challenges. A conceptual model will be designed during this stage. Based on the design, system will be implemented in multiple phases. Initially, dataset will be collected and pre-processed. After that, the selected deep learning models will be trained on the dataset. Then these trained models with a proper attention model will be used to generate descriptions from any given video. The flow diagram of the

proposed research is shown in Figure 1 *(Figure/ Flowchart/ Time Schedule diagram are optional and can be used based on requirement).*The final output of the designed model will generate Bengali captions from videos of short length where the video will be taken as input, and textual description will be developed as output. In this scenario, both input and output are sequences, as video is a sequence of frames while the caption is a sequence of words. For this purpose, LSTM, a many-to-many sequence model, will be used.

8.1 Dataset

Data set for this study for video captioning will be generated from MSVD (Microsoft Research Video Description Corpus). This dataset consists of about 120k sentences collected during the summer of 2010. In generating MSVD, workers on Mechanical Turk were paid to watch a short video snippet and then asked to summarize the action in a single sentence. Both the paraphrase and bilingual alteration were captured in the data as the workers were urged to complete the task in the language of their choice. In this year around, 14 research papers have already been published using this dataset. But this dataset uses the English language for a textual description of the videos. Translation of the description of videos will be made in the MSVD dataset in Bengali text from English using manual labour with some help of machine translation.

8.2 Feature Extraction

To extract features, initially, frames will be extracted from videos. Each video will be split into 80 frames irrespective of their length which are then passed to a pre-trained CNN model to extract the feature vector. The deep learning model to be proposed will be trained using the modified MSVD dataset. The CNN model that will be used in this research is preferably VGG-16 for its wide range success in image recognition. Then these frames will be passed through a CNN model for feature extraction.

8.3 Attention Model Design

Using CNN, extracted features from each frame of a video will be fed into an attention model which will then return the region with high attention value. This resulted output will be passed into the LSTM models.

8.4 Textual Description Generation

The extracted features from each frame will be sent to an encoder-LSTM (Long Short-Term Memory) and after the processing of all the frames in encoder-LSTM, the final output will be sent to the decoder LSTM as input. The decoder will then predict a sentence that is a textual representation of the video.

8.5 Optimization

Neural networks have weights and biases which determine the performance of the model.

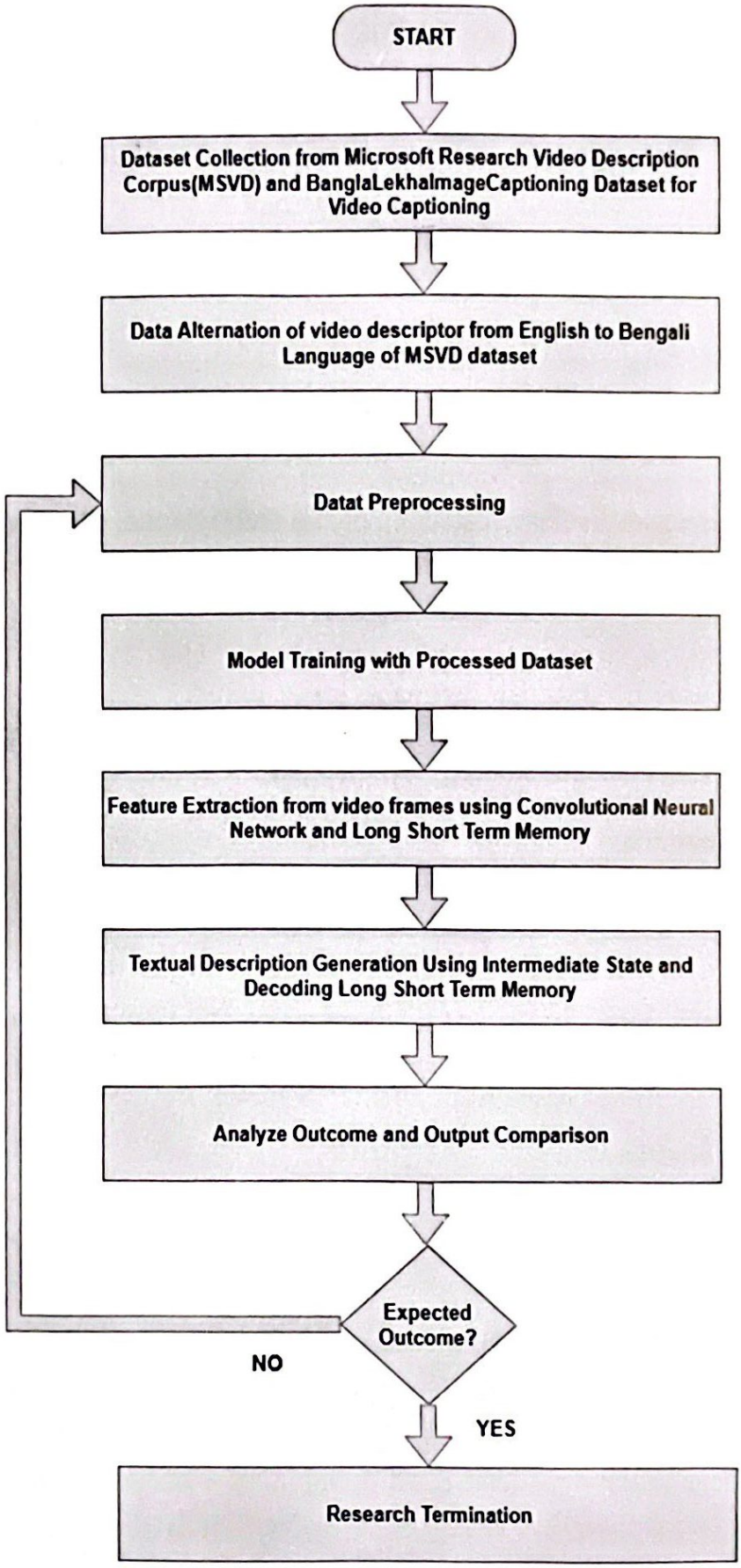


Fig. 1: Work flow diagram of the proposed research *(Flow chart is not a mandatory element)*

this time to how comprehensible it is. Finally, it is read once more paying attention to spelling, grammar, typography, placement of illustrations, etc. and should be revised as and appropriate. When all the chapters are in place, the thesis is read again, paying attention this time to overall understanding, coherence, comprehensibility and presentation. The supervisor, or anyone else approachable should be requested, to read and criticize the early drafts of the thesis.

3.3 Components or Structure of Thesis

The rationale for the structure of a thesis is simply that a thesis must tell a story of research clearly and convincingly. The components of the structure impart logical continuity to the thesis in much the same way that links in a chain confer on its integrity and strength. The following structure or format or sequential order should be followed as closely as possible to the illustrations in attachments in organizing a thesis at MIST. The structure of both undergraduate and postgraduate thesis is similar, exceptions are mentioned in the relevant items as under.

Items A through E indicated below are preliminary pages without any pagination. Items F through K contains pagination in Roman numerals, items L through N has the pagination in Arabic numerals and others follow the alpha numeral (English Arabic) paginations.

A: Cover Pages and Spine. The final thesis is hard bound and the covers (both front and back) must be prepared with a covering of good quality artificial leather cloth (Rexine leather cloth) pasted with white solid card of 250 gm/m^2 insides. The front cover page is understandably the first page of the thesis that reflects the title of the thesis followed by volume number (if the thesis is in multiple volumes in case of Ph.D. thesis), the name(s) of the candidate, the logo and the spelled out name of MIST, the Department, month and year of submission/approval. The front cover will be followed by a blank page of white solid card (150 gm/m^2). The back cover of the thesis is to be kept blank and it precedes a blank white page of solid card (150 gm/m^2). The cover pages must be adhered to the following colour specifications:

Ph. D.	Dark Maroon
M. Phil.	Dark Green
M. Sc. Engg.	Dark Blue
M. Engg.	Ash
B. Sc. Engg.	Black

The spine or side of the covers should contain the surname of the author at the top, the level of thesis with volume number (in case of Ph.D. thesis only; e.g., Ph.D. Thesis: Volume 2, Ph.D. Thesis) at the middle and abbreviation 'MIST' followed by year of approval (e.g., MIST: 2020) all in vertical orientation from top and in font sizes preferably within 16–18 Arial all in upper cases. For small volume thesis the writings (information) on the spine is optional. Samples of cover and spine for undergraduate and postgraduate levels are shown in Template.TP.01, Template.TP.02, Template.TP.03 and Template.TP.04.

The evaluation copies of the thesis may be spiral bound or soft bound. The final hard bound copies are to be submitted after the oral examination. The writings and information on the cover pages should screen printed in upper cases of Arial font sizes 16-18 in golden colour

(font size 18 for thesis title and size 16 for others). The coloured logo of MIST must be in UV printing or similar to ensure the original colours of the logo.

B: Title Page. The title page comes after the front cover page and blank solid card page, that shows the title of the thesis followed by volume number if in multiple volumes, the candidate's name(s), a statement of presentation in the form 'A Thesis Submitted in Partial Fulfillment of the Requirement for the Degree of ..... in ..... Engineering', followed by monogram of MIST, spelled out name of MIST, the Department, month and year of submission. Sample title pages are presented in Template.TP.05 for undergraduate thesis and Template.TP.06 for postgraduate thesis.

C: Certificate of Approval. (Template.TP.07 for undergraduate and Template.TP.08 for postgraduate thesis).

D: Declaration of Originality. (Template.TP.09).

E: Dedication [optional for all]. (Template.TP.10).

Now, the numbering the pages will start with roman numbers: i, ii, iii, iv, v, etc.

F: Abstract. [both in English and Bangla] (Template.TP.11) and (Template.TP.12)

G: Acknowledgements. (Template.TP.13)

H: Table of Contents. (Template.TP.14)

I: List of Figures. (optional for undergraduate and master's thesis): (Template.TP.15)

J: List of Tables. (optional for undergraduate and master's thesis): (Template.TP.16)

K: List of Notation. (optional for undergraduate and Master's thesis): (Template.TP.17)

Now the numbering your pages will start with Arabic numbers: 1, 2, 3 etc.

L: Main Text. The research outcome shall be reported in a number of chapters, starting with Introduction and ending with Summary or Conclusions. Typical Introduction chapter is illustrated in (Template.TP.18)

M: Citations and References. (Template.TP.19, Template.TP.20 and Template.TP.21)

N: List of publications. (optional for undergraduate and master's thesis)

Now the numbering of pages will start for Appendices like A-1, A-2 etc.

O: Appendices, if any (from 1 to n)

Now the numbering of pages will start for Subject Index like S-1, S-2 etc.

P: Subject index. (optional for all thesis)

3.3.1 Thesis Structure for Various Academic Degrees

The thesis structure comprises three main parts like preliminary pages, body or text and reference list with several accessories such as appendices, list of publication and subject index. The following Table summarizes the arrangements of a thesis structure for various degrees offered by MIST.

Thesis part	Items	Pagination and its font style		Requirement*			
		Style	Numbering	UG	M. Engg.	M.Sc. Engg./ M.Phil.	Ph.D.
Preliminary pages	Cover page & spine	NA	No	Req.	Req.	Req.	Req.
	Title page	NA	No	Req.	Req.	Req.	Req.
	Approval cert.	NA	No	Req.	Req.	Req.	Req.
	Declaration	NA	No	Req.	Req.	Req.	Req.
	Dedication	NA	No	Opt.	Opt.	Opt.	Opt.
	Table of Contents	Roman	Starting with i	Req.	Req.	Req.	Req.
	Acknowledgements	Roman	Next to above	Req.	Req.	Req.	Req.
	List of Figures	Roman	Next to above	Opt.	Opt.	Req.	Req.
	List of Tables	Roman	Next to above	Opt.	Opt.	Req.	Req.
	List of Notation	Roman	Next to above	Opt.	Opt.	Req.	Req.
	Abstract	Roman	Next to above	Req.	Req.	Req.	Req.
Main text	Chapters 1, 2, 3 etc.	Arabic	Starting with 1	Req.	Req.	Req.	Req.
List of references	--	Arabic	Next to above	Req.	Req.	Req.	Req.
Appendix	Appendix-A, B, etc.	Alpha-numeric	Staring with A-1	Opt.	Opt.	Opt.	Opt.
Subject index	--	Alpha-numeric	Staring with S-1	NR	NR	NR	Opt.

** Req. means required; Opt. means optional; NR means not required*

3.3.2 Word and Page Counting for a Thesis

There are no strict restrictions of page and word limits of a thesis. However, in order to avoid unnecessary and cumbersome reading, a guideline is provided to limit the numbers of pages and words. Following items are included in the page and word counts of a thesis: Title page, Dedication page, Acknowledgements, List of notations, Abstract, Body of Main Text, References, Tables, and Figures. Approximate word equivalents for pages, Tables, Figures, and Equations are listed below.

Item	Approximate Word Equivalents
Each full 1.5-spaced page of text	330 words
Large Table (larger than ½ MS Word page)	550 words
Small Table (smaller than ½ MS Word page)	200 words
Large Figure (larger than ½ MS Word page)	350 words
Small Figure (smaller than ½ MS Word page)	150 words
Number of display equations more than ½ page	50 words/equation

Note: If a Figure or Table exceeds ½ a page, it will be considered a large Figure.

3.3.3 Thesis Title

The title of the thesis is highly focused and a meaningful description of the manuscript. A good thesis title should contain fewest possible words that adequately describe the contents. Templates for title are provided in Template.TP.05 and Template.TP.06 for undergraduate

and postgraduate thesis respectively. The following points are to be remembered in formulating the title of a thesis.

(i) The title should be self-explanatory to readers in the chosen area and should describe the content of the thesis accurately and concisely.

(ii) The title of the thesis should not be too short or too long. It should be limited to 120 characters including spaces between words.

(iii) The title should indicative of the scope of the study.

(iv) Thesis title should not contain any symbols (including Greek symbols such as π, α, etc.), initials, formulas (including chemical formulas), subscripts, superscripts, numerical characters, acronyms or even abbreviations in brackets.

(v) The titles often contain waste or redundant words and phrases–that can be left out without compromising the effectiveness of the title. Often, these words and phrases appear at the start of overlong titles. Examples of waste words and phrases include: 'A', 'An', 'The'. 'Investigations into', 'Studies on', 'Observations on' etc. which should be avoided.

(vi) The title of a thesis should not be a full sentence and should not contain any parenthesis and full stop at the end.

(vii) The title of the thesis should be approved following due processes of MIST.

3.3.4 Certificate of Approval, Declaration of Originality and Dedication

A list of names and appropriate professional titles of the members of the examination committee are printed on this page including the signatures of the examiners. Template.TP.07 and Template.TP.08 illustrates respectively the Certificate of Approval for undergraduate and postgraduate thesis.

The signed declaration of originality is a component of every Bachelor's, Master's or Ph.D. thesis which is illustrated in Template.TP.09.

Dedication is to whomever the author would like it to be dedicated to, whether it is the author's parents or the best friend. Acknowledgments are reserved for those who helped out with the thesis in some way or another and it is possible to dedicate to someone while also mentioning in the acknowledgments. Dedication is optional for all levels of thesis and illustrated in Template.TP.10.

3.3.5 Abstract

Abstract should be complete by itself and it should summarize the aims, scope, research methodology and conclusions of the thesis. An effective abstract should allow a reader to understand the basic content of the thesis quickly and precisely. From an abstract readers can judge whether it is relevant to their own research interests and, therefore, worthwhile reading the thesis itself. Pointing out the novelty of the work is important in this regard. It should limited to approximately 300 - 600 words (maximum two A-4 pages in 1.5 spacing) depending on the level of degrees. For undergraduate thesis page limit is one, for Master's it is one and a half and for Ph.D. thesis it is two. It is normal practice to present the Abstract in a possible lesser number of paragraphs that contains -

(i) main objectives and scope of the research

(ii) methods employed

(iii) a brief summary of the results

(iv) the key conclusions

The abstract should not contain any:

(i) discussion of the results

(ii) citation and referencing to literature

(iii) Table and Figures

(iv) abbreviations that are not standing alone (examples of standing alone are RCC, pH, USA)

Sample Abstract is provided in Template.TP11. In addition, a Bangla translation of Abstract of the thesis, which is the requirement of MIST, is also provided in Template.TP.12. It is to be noted that while translating in Bangla, if appropriate technical terms are not available, the English terms may be spelled out in Bangla alphabet and is followed by the English term itself in parenthesis as indicated in Template.TP.12. Use of 14 font size Sutonny OMJ is suggested in typing for Bangla.

3.3.6 Acknowledgements

A page of acknowledgments is usually included at the beginning of a thesis immediately before or after the Table of Contents. Acknowledgments enable the researcher to thank all those who have contributed in completion of the research work. Careful thought needs to be given concerning those whose inputs are to be acknowledged and in what order. Generally, one should express appreciation in a concise manner and avoid emotive languages. The following are often acknowledged in these types of acknowledgments: supervisor, co-supervisor, peers in the laboratory, other academic staff in the department, technical or support staff in the department, colleagues from other departments, other institutions, or organizations, former students, family, and friends. When composing the Acknowledgements of thesis, the following two key components should be remembered:

(i) Firstly, any technical assistance received in the laboratory or elsewhere during your research should be acknowledged. The following are often acknowledged: (a) supervisor, co-supervisor, (b) peers in the laboratory, (c) other academic staff in the department, (d) technical or support staff in the department, (e) colleagues from other departments, (f) other institutions, or organizations, (g) family, and (h) friends.

(ii) Secondly, acknowledgements should be referred to any financial assistance, such as fellowships, grants or contracts, which have been received for the purpose of the study.

In general, the author should be courteous and precise with the wording of Acknowledgements. For example, saying 'Thank you' to those friends and colleagues who have helped carrying out the research to show that their advice and support are valued. Illustrations of Acknowledgements are provided in Template.TP.13.