

Project Meeting 04/04/24

Current Progress – Interim Report

- Remains my strongest contribution at the moment
- Background is 80% complete
- Lacking in technical discussion

Current Progress – Interim Report

- Previous project quality acts as reference
- Would value a moment to address any comments in the current draft
- With minor corrections from yourself (no comments from second marker)

Current Progress - Project

- Lack of significant progress over lecture time
- nnU-Net studied and output is generating
- Scope of project is fully understood

Current Progress - Interim Deliverable Plan

Chapter 6

Interim Deliverables

6.1 Project Plan

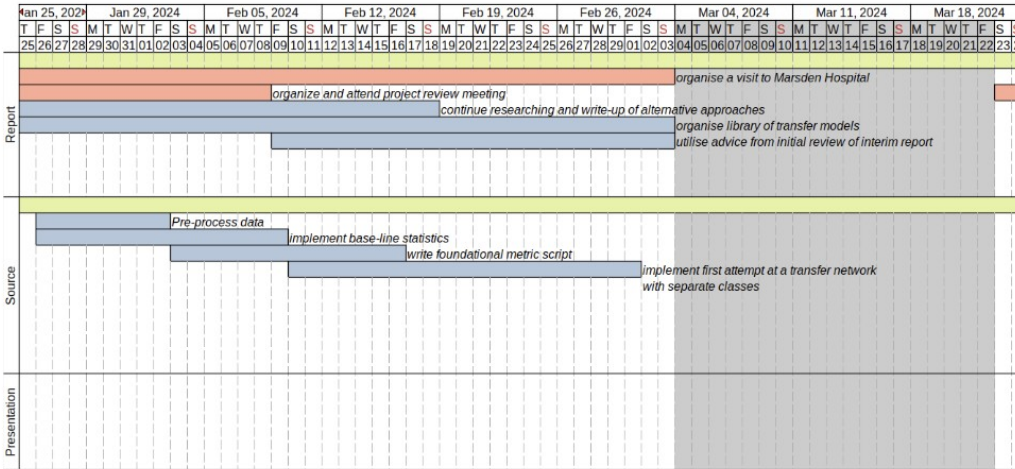
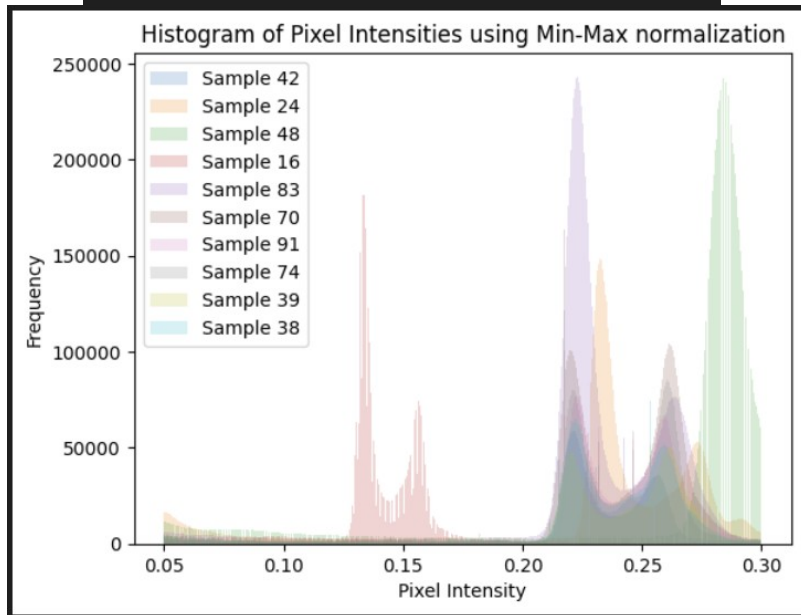
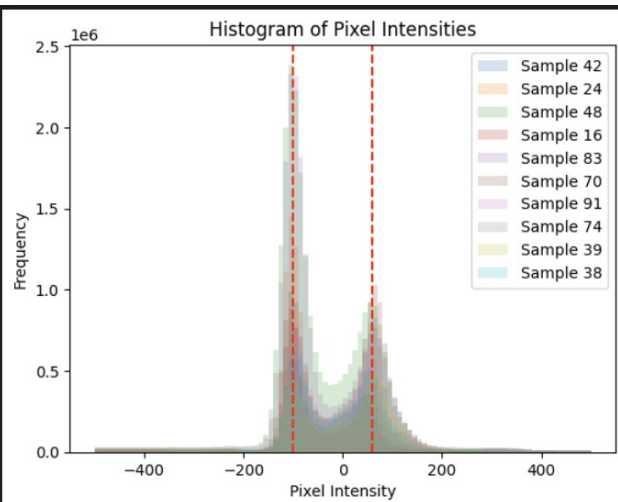


Figure 6.1: Plan for project before exams

- Accomplished half of desired achievements with severe inaction to first attempt
- Metric system trivial to implement

Current Progress - Pre-processing

- Independent pre-processing not effective
- Current plan is to utilize the nnU-Nets dynamic pre-processing pipeline to process images with minor adaptations



Plans for the future – Near Future

- Recently discovered paperswithcode website
- In the next week I will find and implement a collection of pre-trained models (e.g. TotalSegmentator, Univeral-seg., SAM-medical)

Plans for Mid Future (following month)

- I'd like to reach out to Marsden by email to clarify target volume logic

Notation of Structures

1. Let the Anorectum be denoted as A
2. Let the Bladder be denoted as B
3. Let the Cervix be denoted with C
4. Let the CTVn be denoted with C_n
5. Let the CTVp be denoted with C_p
6. Let the GTVp be denoted with G_p
7. Let the GTVn be denoted with G_n
8. Let the Pelvic Lymph Node be denoted as L_p
9. Let the Common Iliac Lymph Node be denoted as L_i
10. Let the Para-aortic Lymph Node be denoted as L_{pa}

11. Let the Parametrium be denoted with P
12. Let the Uterus be denoted with U
13. Let the Vagina be denoted with V

3.5.1 Relationship between Structures

1. Let O denote the set $O = \{B, A, C_n, C_p, P\}$ for a particular patient. If we want to talk about a specific patient, we should use the super-script notation to differentiate patients, e.g., $O^i = \{B^i, A^i, C_n^i, C_p^i, P^i\}$.
2. Let the overlap of two structures be denoted by the set intersect symbol \cap .
3. Let the joint area of two structures be denoted by the set union symbol \cup .

1. There should be no overlap between the CTVn, CTVp or Anorectum.

$$\forall i, j \in \{C_n, C_p, A\} \text{ with } i \neq j, i \cap j = \emptyset \quad (3.1)$$

2. The Parametrium may overlap with all of the other structures.

$$\forall i \in S, P \cap S_i \neq \emptyset \quad (\text{Possibly}) \quad (3.2)$$

3. The Bladder may overlap with the CTVn.

$$B \cap C_n \neq \emptyset \vee B \cap C_n = \emptyset \quad (3.3)$$

4. The CTVp is defined as a compound structure containing:

$$C_p = \overbrace{C \cup G_p}^{\text{High Risk CTV}} \cup U \cup V \quad (3.4)$$

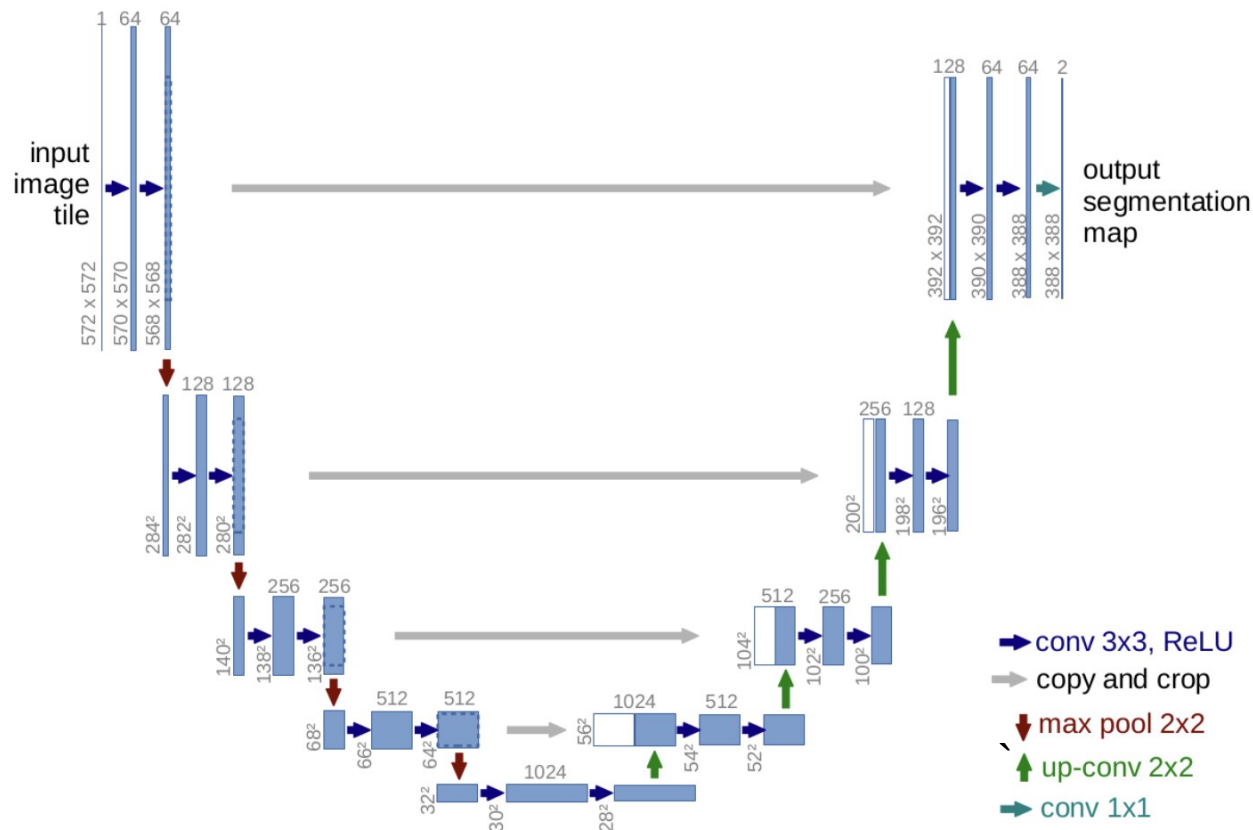
5. The CTVn is defined as a compound structure containing:

$$C_n = G_n \cup L_i \cup L_p + L_{pa} \quad (3.5)$$

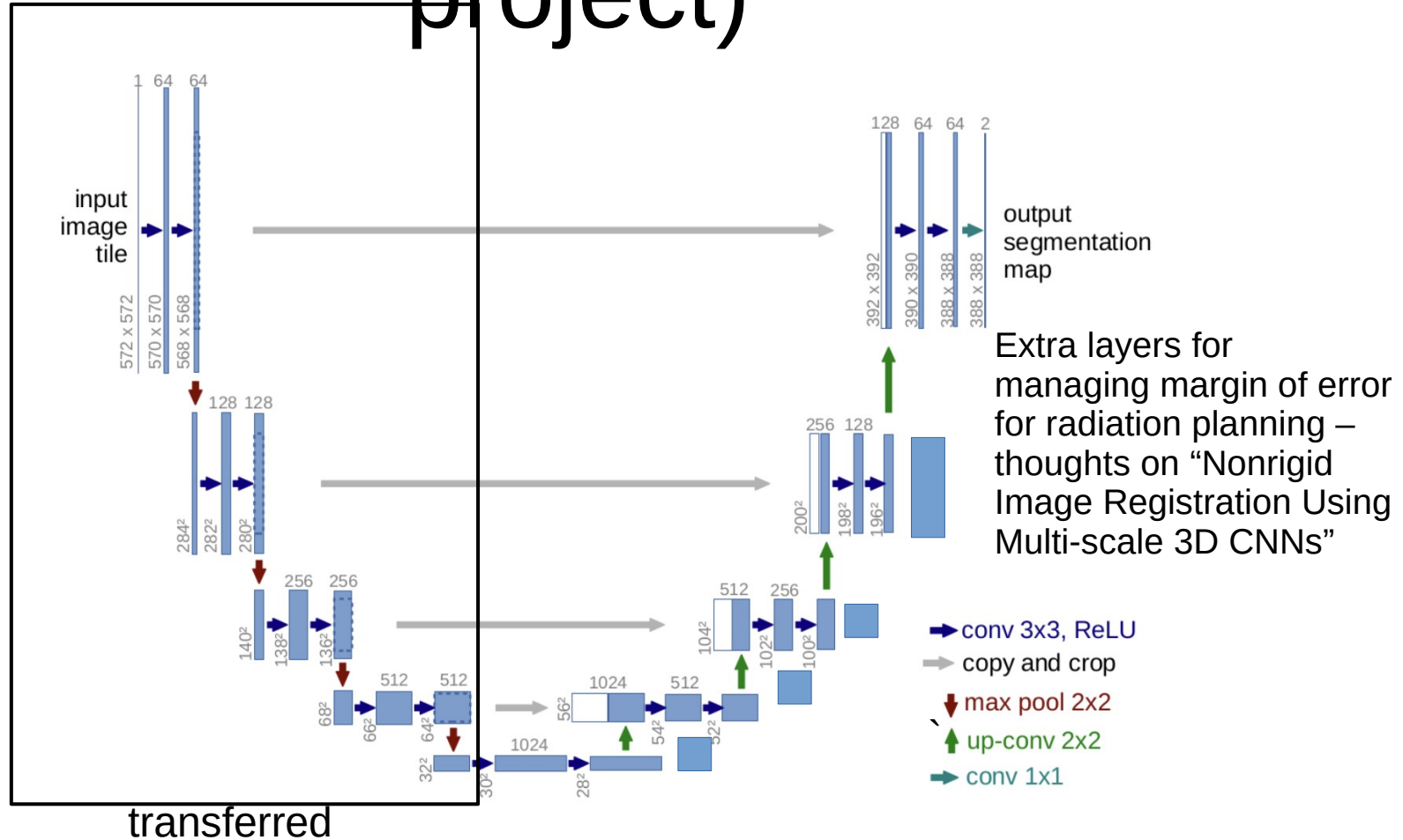
Plans for Mid Future (following month)

- Experiment With Individual segmentations or one-shot segmentation for the 5 classes

Plans for Far Future (mid-end of project)



Plans for Far Future (mid-end of project)



Plans for Far Future (mid-end of project)

- Transfer learning boosting like TrAdaBoost because we break the ‘identical distribution assumption’
- Incorporate a variation of atlas learning where we average the predictions of multiple pre-trained networks

Conclusion

April

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12

May

M	T	W	T	F	S	S
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

June

M	T	W	T	F	S	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
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Stage 1 – Running pre-trained models relevant to the task of medical organ segmentation

Conclusion

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Stage 1 – Running pre-trained models relevant to the task of medical organ segmentation
Stage 2 – Implementing pipeline for classifying each class separately using a selected architecture for a proof of concept. Also, clarify target volume logic with Royal Marsden

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- Stage 2 – Implementing pipeline for classifying each class separately using a selected architecture for a proof of concept. Also, clarify target volume logic with Royal Marsden
- Stage 3 – Experiment with one-shot PTV area planning and also other pipelines. (Non-rigid image transformation?)

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Stage 5 – Presentation and administrative pieces for submission