

Introduction

You are a marine biologist who is studying the population of fish living in a coral reef area located in Taiwan. You are particularly interested in the variation of fish counts over time.

Your team has installed a fixed underwater camera that is continuously recording videos of the fish. You intend to use these videos to count the fish that can be observed over time, and to study the variations in fish counts.

The number of videos is too large to be manually analyzed by you and your colleagues. Thus your colleague Lucas has implemented a video analysis software that is able to automatically detect the fish that appear in the videos.

Lucas warns you that this software can not perfectly detect fish. And he wants to know if the accuracy of the video analysis is good enough for your scientific study of the variations of fish counts over time.

Please evaluate the trustworthiness of the fish counts produced by the software, and decide if you will be using the software for your research.

During the evaluation, please describe aloud everything that you are doing.

When you are ready to start the evaluation, go to the next page.

Task 1/3 - Evaluate the video analysis software

On the following pages, you will see a presentation of the first version of the software. After checking what errors are contained in the fish counts, please decide if this software is suitable for your needs.

Videos

Video Analysis

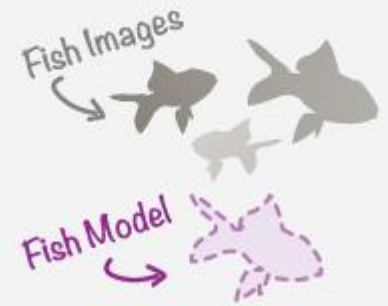
Fish Counts



OUR VIDEO COLLECTION

We need to count the fish that appear in a very large set of videos (e.g., around 24 000 videos per year). The software that can automatically detect fish is based on a model of the fish that was defined using examples of fish images.

For evaluation purposes, we asked marine biology experts to manually detect the fish in a small set of videos. To evaluate the accuracy of the video analysis software, we compare the manual count with the automatic fish count.



THE COLLECTIONS OF VIDEOS

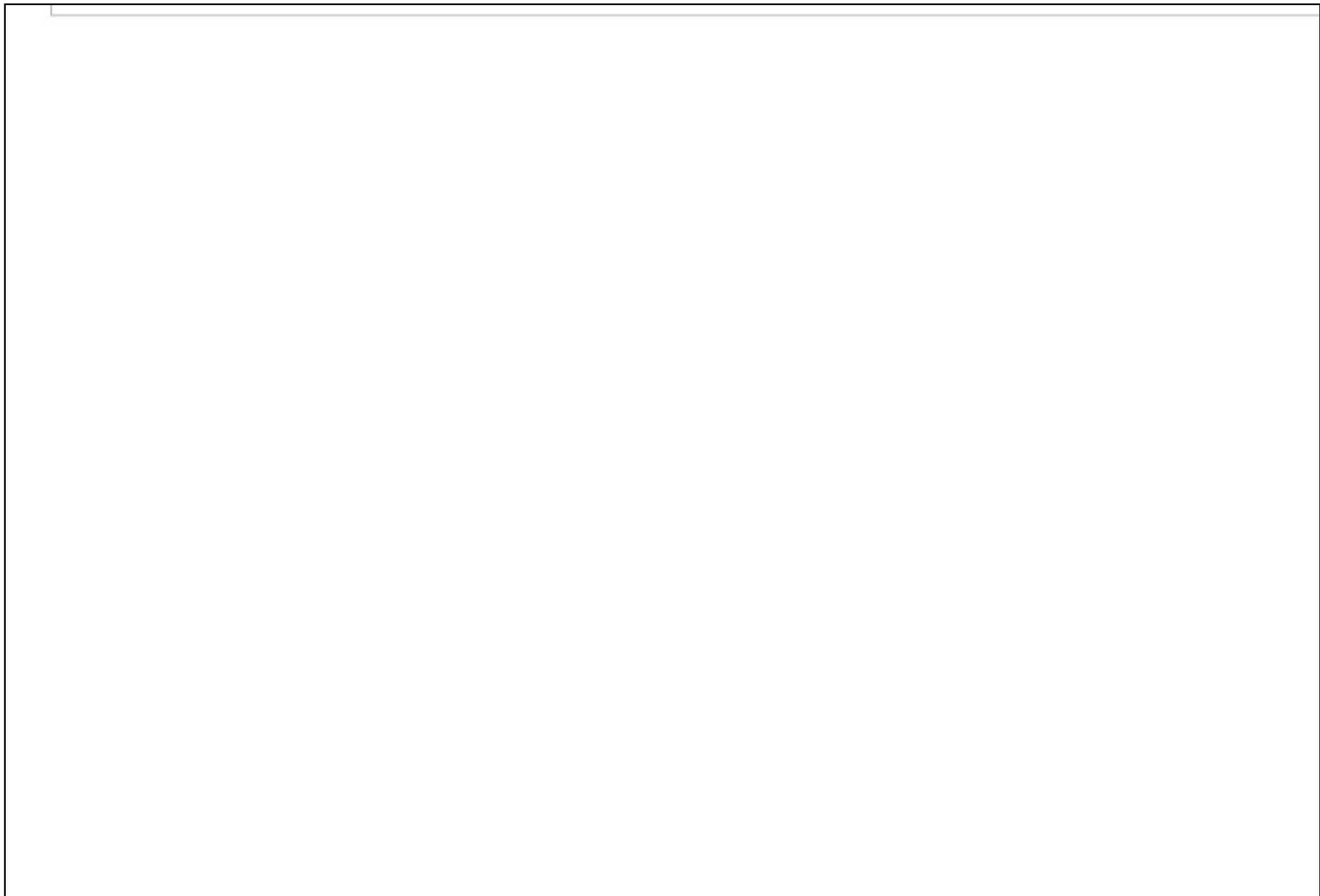
Videos used for Evaluation
To compare manual and automatic fish counts

204 videos

23 370 videos

Videos in 2011
What we need to analyze

EXAMPLES OF FISH IMAGES IN THE COLLECTIONS



Videos

Video Analysis

Fish Count

THE ACCURACY OF OUR FISH COUNTS



To evaluate the quality of our automatic count of fish, we asked marine biology experts to manually count the fish that appear in the set of Videos for Evaluation. In the 102 videos for evaluation, experts found 5585 fish, whereas our automatic count is of 4407 fish.



How many fish
in the videos?

THE ACCURACY OF AUTOMATIC FISH COUNT

Automatic Count
What we counted

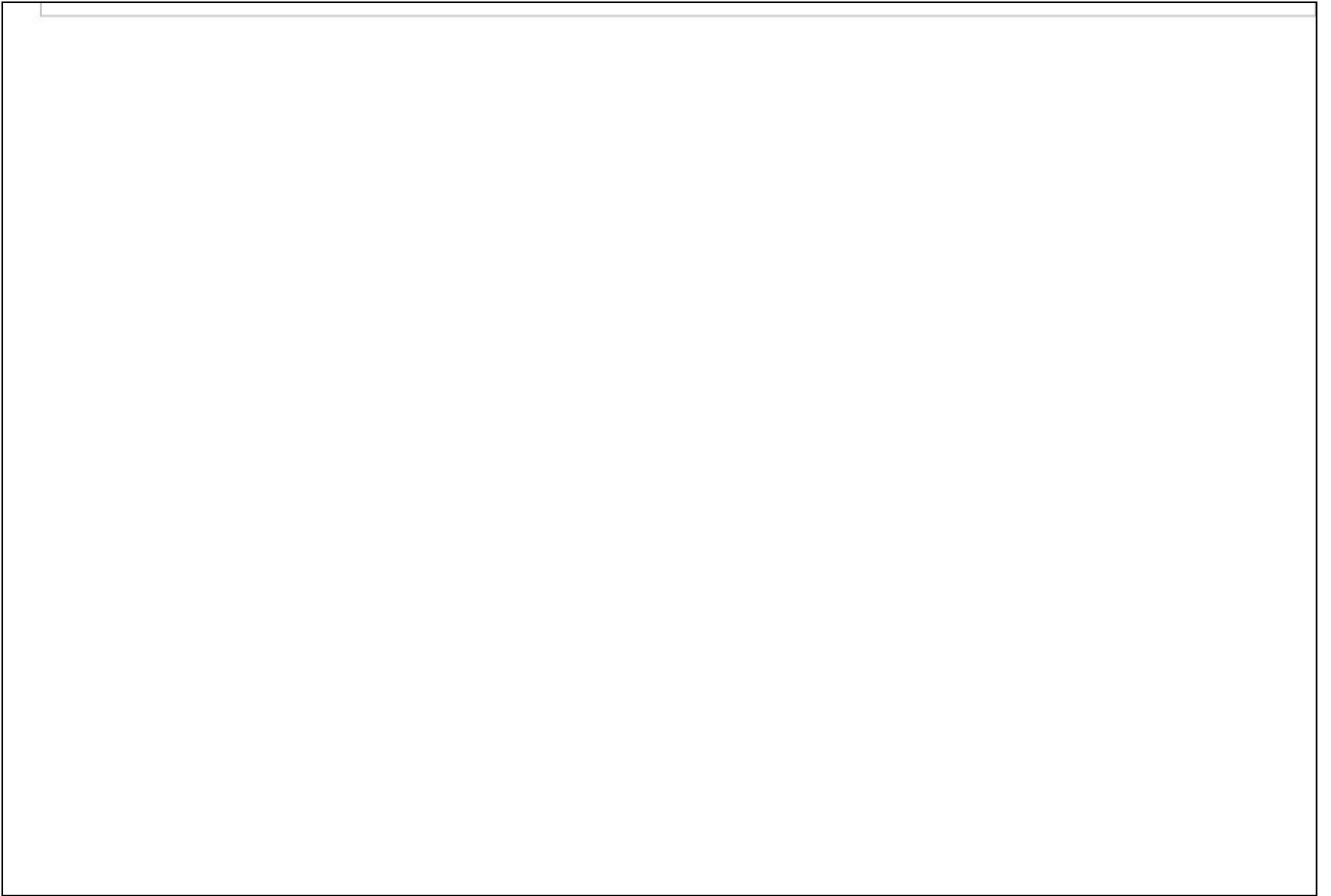
4407 fish

Manual Count
What experts counted

5585 fish

Legend:

- Automatic Count:** the number of fish detected by our video analysis software (4407 fish)
- Manual Count:** the number of fish detected by experts (5585 fish)



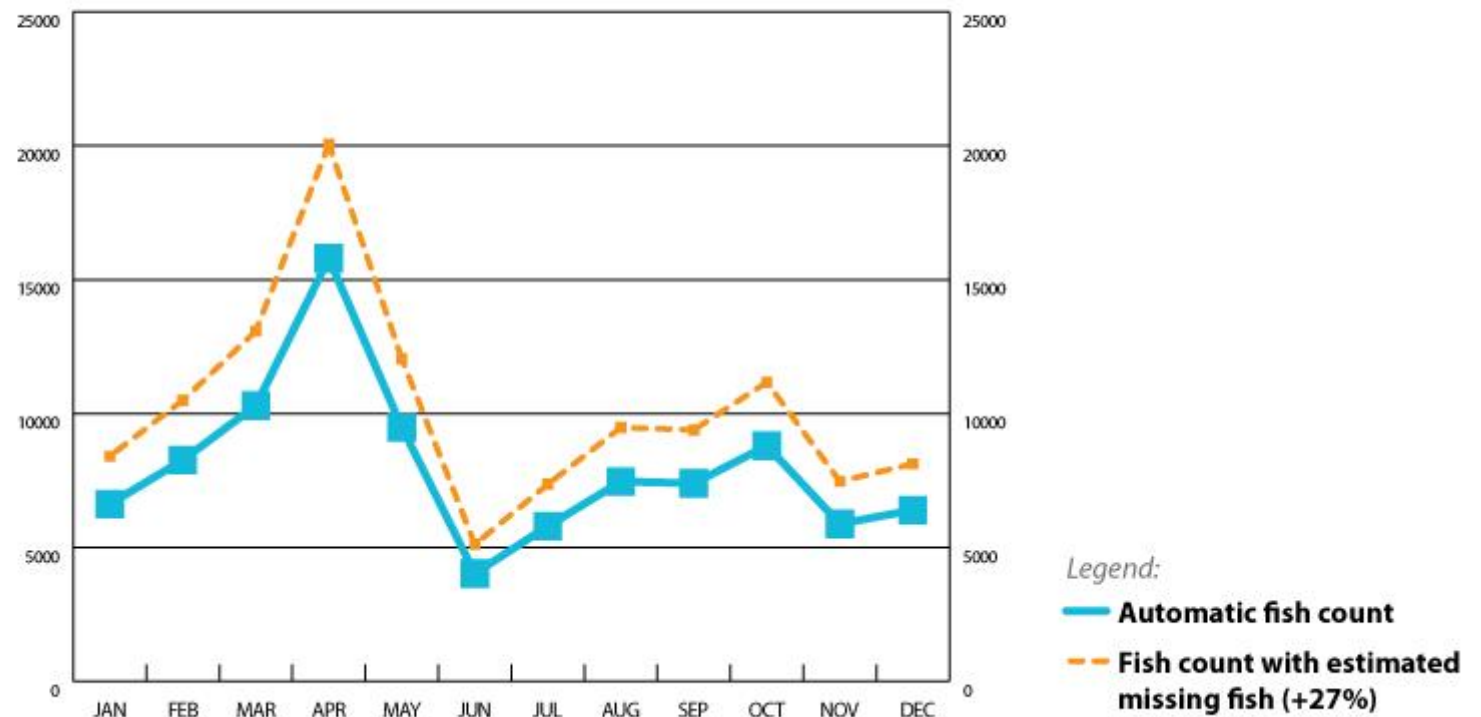
APPLYING THE VIDEO ANALYSIS TOOL TO A LARGE SET OF VIDEO

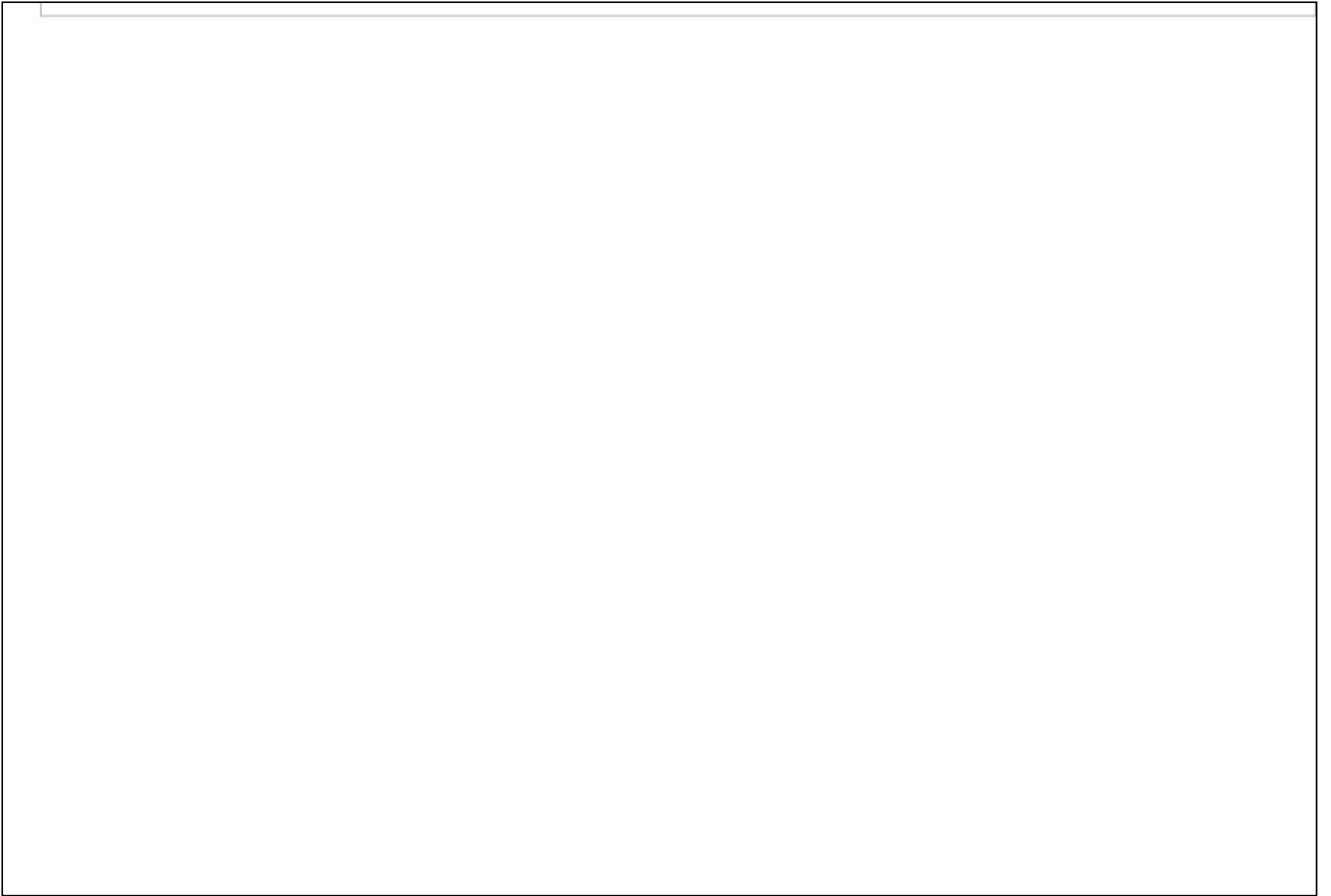


For the year 2011, we detected a total of 96 186 fish. The monthly fish counts are represented by the solid blue line below.

During the evaluation, we observed that the automatic fish count was 27% lower than the manual fish count. For instance, if the fish counts in 2011 were 27% higher, we would obtain the dashed orange line below.

AUTOMATIC FISH COUNTS IN 2011

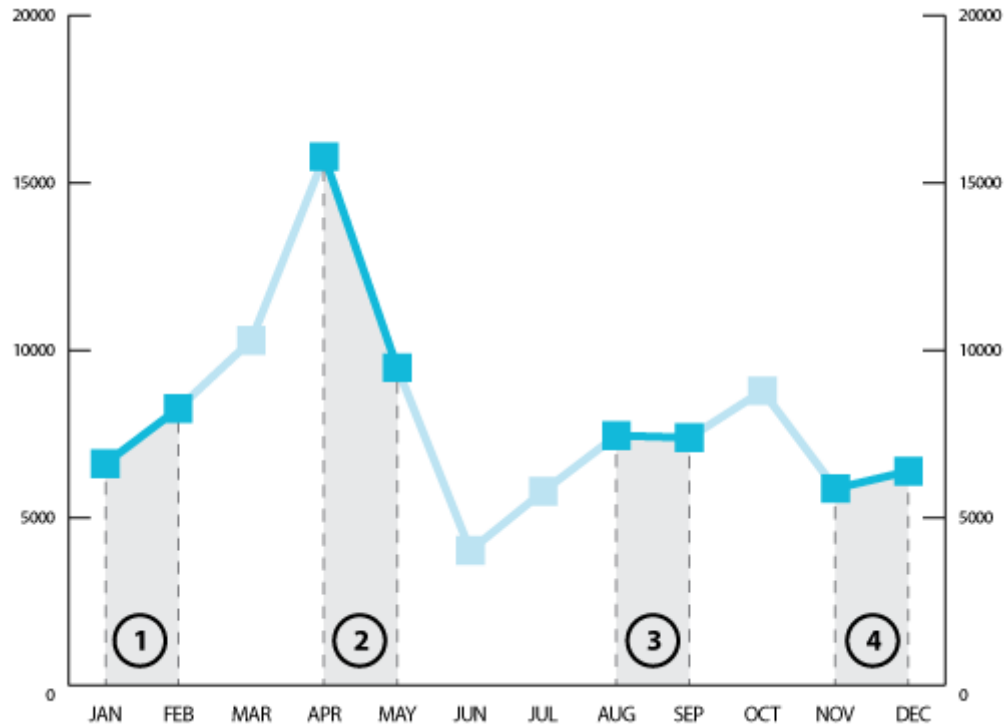




Task 1/3 - Questionnaire p.1/4

Please fill in the following questionnaire. You can go back to the presentation of the software, and read it again anytime is necessary.

We focus on the four following trends that can be observed in the automatic fish counts for 2011.



1. What is your level of confidence in the above trends?

The trends observed in the automatic count can be different than the trends occurring for real in the ecosystem. This is particularly due to the errors introduced by the video analysis software.

For each trend identified above, please indicate how you would qualify the intensity of the trend (e.g., small or important increase). And please also indicate how confident you are in the fact that the observed trend is exactly the same in reality.

	What trend is it?	How likely is it that the trend is the same in reality?
Trend 1 - Jan. - Feb.	<input type="text"/>	<input type="text"/>
Trend 2 - Apr. - May	<input type="text"/>	<input type="text"/>
Trend 3 - Aug. - Sept.	<input type="text"/>	<input type="text"/>
Trend 4 - Nov. - Dec.	<input type="text"/>	<input type="text"/>

Do you have any remark about the difference between observed trends and the trends in reality?

Task 1/3 - Questionnaire p.2/4

2. Why automatic counts can be different from expert count?

Please indicate if you think that the following facts can possibly explain why the automatic count may not be the same as the manual count.

Yes, it can explain the difference between manual and automatic counts. No, it does not explain the difference between manual and automatic counts. I don't know.

The automatic fish count is likely to contain non-fish objects (e.g., rocks) that are incorrectly considered as being a fish.

When one single fish swims in and out of the camera's field of view, it is counted several times by the video analysis software. It is also counted several times by the experts that manually count the fish.

The automatic fish count is likely to miss some fish that are not detected at all.

Do you have any comment?

3. Are there other sources of errors?

The video analysis errors were evaluated for a small set of Videos for Evaluation (as shown in the "Video" tab). The video analysis software is applied to a much larger set of videos to process. When analyzing a larger collection of videos, do you think that it is possible to encounter the following sources of errors? And would you like to measure and verify these errors?

Can we encounter these errors? Do you want to evaluate the importance of these errors?

Some video may be missing due to errors during the recording of the video.	<input type="text"/>	<input type="text"/>
Some video may be of very poor quality due to video encoding errors.	<input type="text"/>	<input type="text"/>
Some video may be of very poor quality due to the presence of dirt or algae on the camera lens.	<input type="text"/>	<input type="text"/>
Some videos may not be analyzed at all due to video processing errors.	<input type="text"/>	<input type="text"/>
The camera's field of view may have changed (e.g., due to strong current).	<input type="text"/>	<input type="text"/>
For the large collection of videos for the year 2011, some fish counts may include more non-fish objects, in a much greater proportion than for the videos used for evaluation.	<input type="text"/>	<input type="text"/>
For the large collection of videos for 2011 some fish counts may miss more non-detected fish, in a much greater proportion than for the videos used for evaluation.	<input type="text"/>	<input type="text"/>

Can you think of any other source of error?

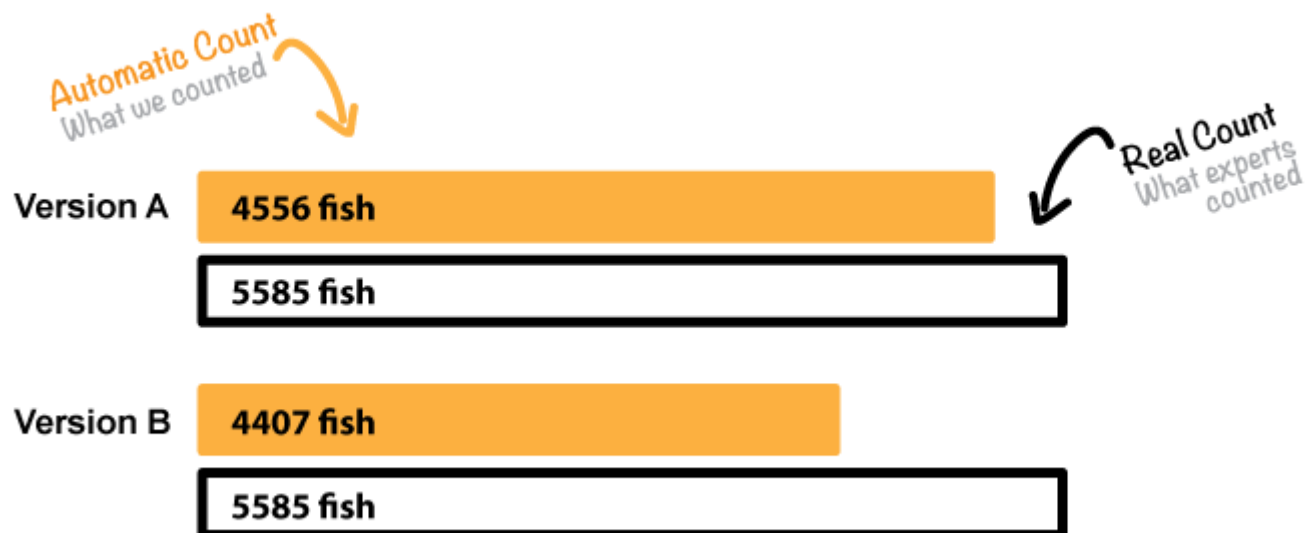
Task 1/3 - Questionnaire p.3/4

To improve the accuracy of the video analysis software, Lucas has developed and tested several versions of the software. The different versions can produce different counts of fish. Lucas has chosen the version that produces the fish count that is the closest to the fish count produced by experts.

4. The image below shows the fish counts produced by 2 different versions of the video analysis software that Lucas has developed. Which is the most accurate version of the software?

Version A	Version B	I don't know
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

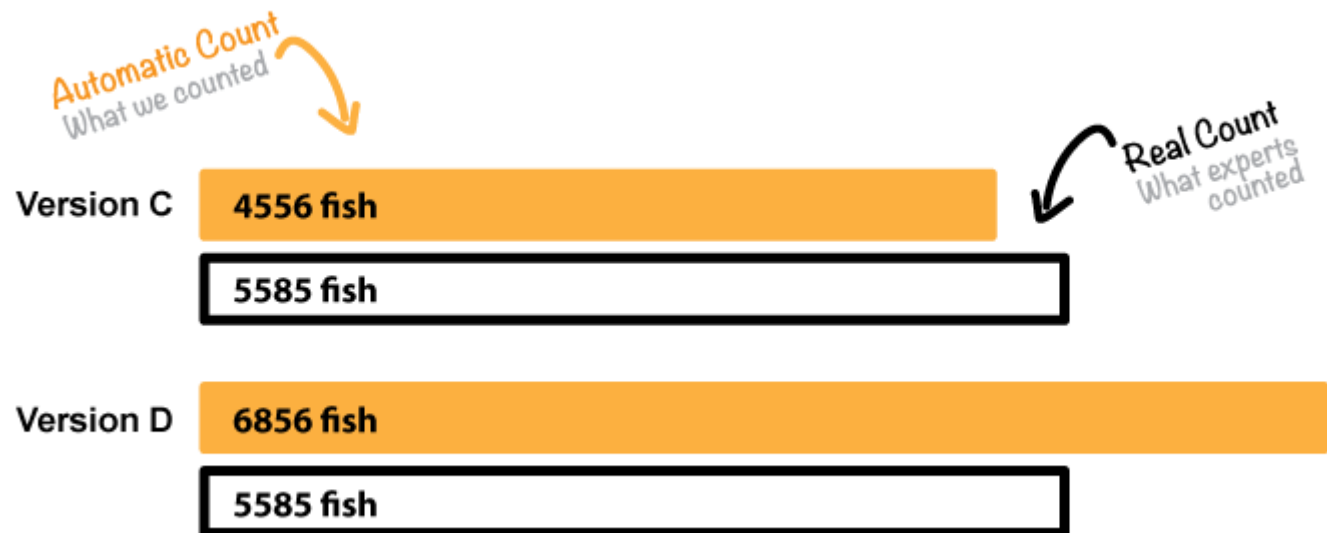
Why did you choose this version?



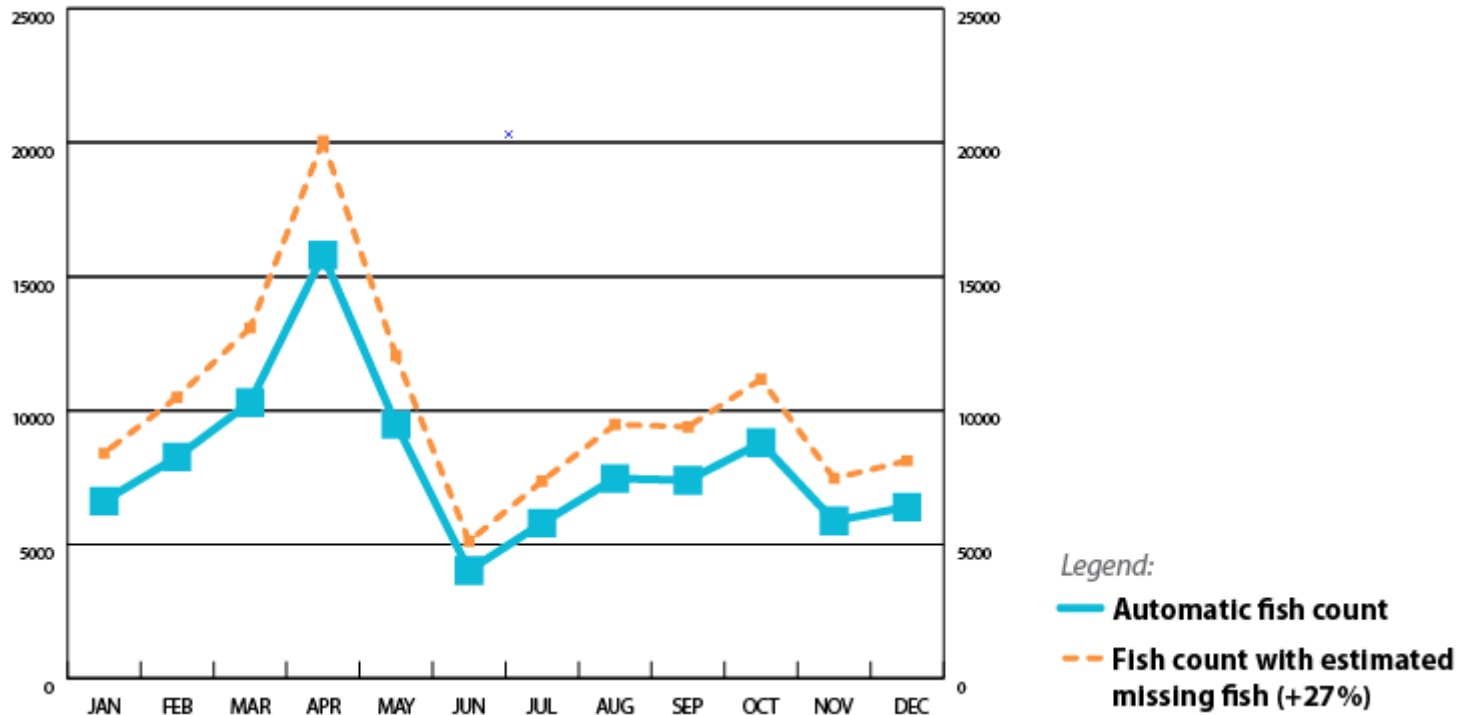
5. The image below shows the fish counts produced by 2 different versions of the video analysis software that Lucas has developed. Which is the most accurate version of the software?

Version C Version D I don't know

Why did you choose this version?



The image below shows the fish counts for the videos in the year 2011 (the solid line). It also reports the proportion of missing fish (27%), as estimated from the fish counts for the videos for evaluation (the dashed line).



6. Which fish count would you choose to use for studying the variations of fish counts over time?

- I would choose the automatic count without a report of the potential errors (the solid blue line above).
- I would choose the automatic count with report of the potential errors (the dashed line above).
- I would choose to use both of them and compare them.
- I don't know.

Why would you choose this?

Task 1/3 - Questionnaire p.4/4

7. Please indicate how much you agree with the following statements.

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
This software is suitable for counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software is transparent its about possible errors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Th software correctly handles the errors it produces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software uses an appropriate method for analyzing the videos and counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The given explanations contained enough information for understanding how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts produced by the software are as good as the fish counts that marine biology experts could produce.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts are trustworthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The accuracy of the software is good enough to be used for the scientific study of trends in fish abundance over time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would need more explanations about how the software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to use the video analysis software to count fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was interested in the explanations given about how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand how to handle the errors that were produced by the video analysis software and minimize their influence on my scientific research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how the errors produced by the video analysis software can influence the results of my scientific study of fish counts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understood the explanations given about the video analysis software.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have any other question? or any additional information you would need?



Task 2/3 - Evaluate the video analysis software

You will see the second version of the software.

After checking what errors are contained in the fish counts, please decide if this software is suitable for your needs.

When you are done with reading the presentation, please go to the next page.

Videos

Video Analysis

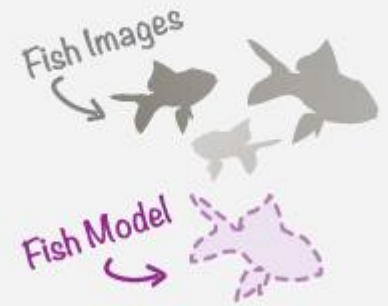
Fish Counts



OUR VIDEO COLLECTION

We need to count the fish that appear in a very large set of videos (e.g., around 24 000 videos per year). The software that can automatically detect fish is based on a model of the fish that was defined using examples of fish images.

For evaluation purposes, we asked marine biology experts to manually detect the fish in a small set of videos. To evaluate the accuracy of the video analysis software, we compare the manual count with the automatic fish count.



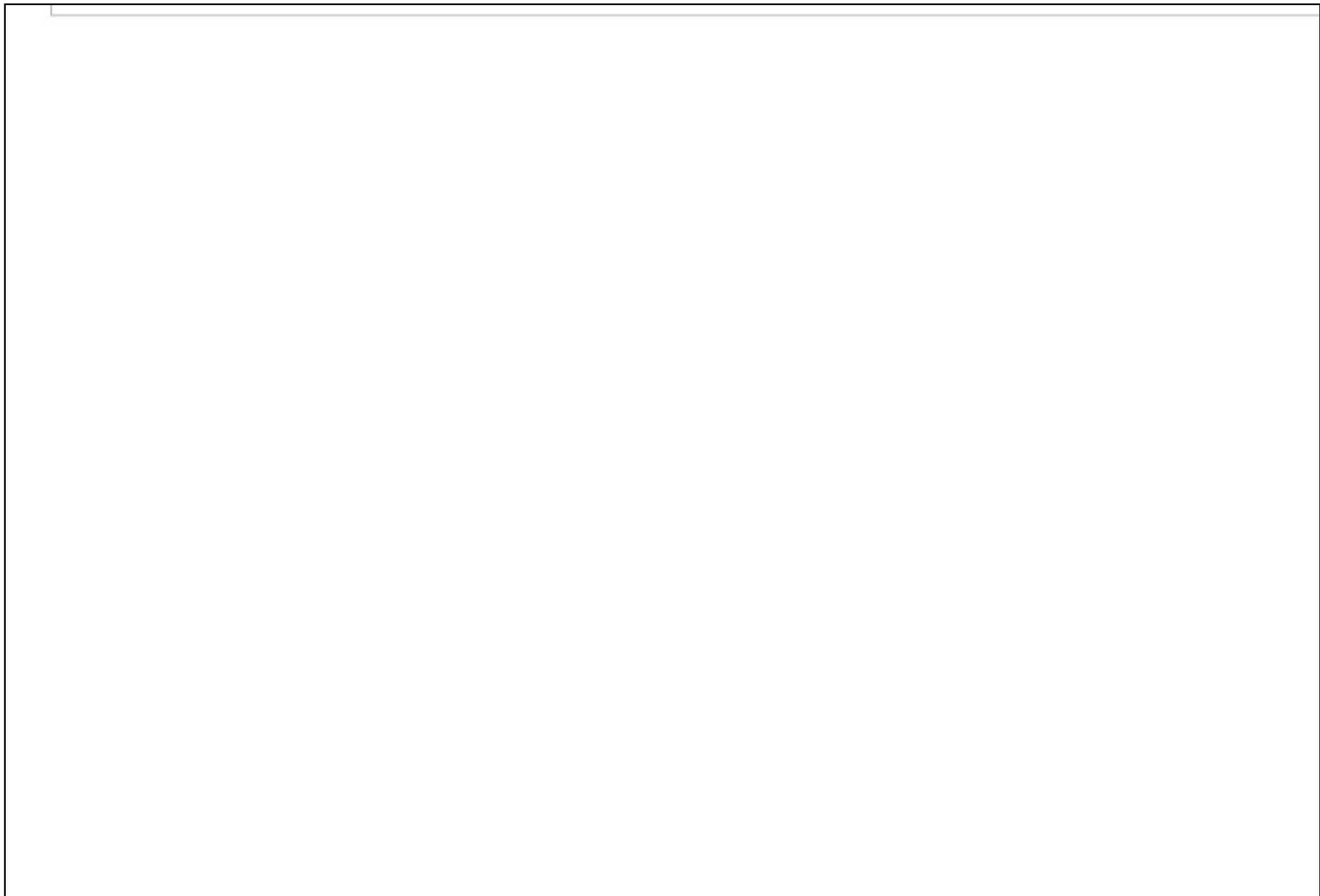
THE COLLECTIONS OF VIDEOS

Videos used for Evaluation
To compare manual and automatic fish counts
204 videos



Videos in 2011
What we need to analyze

EXAMPLES OF FISH IMAGES IN THE COLLECTIONS



THE DETAILED EVALUATION OF VIDEO ANALYSIS



We compared the detected fish one by one, and labelled them in 3 sorts:

- The objects (e.g., algae) we incorrectly detected as a fish. We call them False Positives (FP).
- The fish we successfully detected. We call them True Positives (TP).
- The fish we failed to detect. We call them False Negatives (FN).

In the videos for evaluation, we incorrectly counted 312 non-fish objects (FP), we successfully detected 4095 fish (TP), and we failed to detect 1490 fish (FN).



THE ACCURACY OF AUTOMATIC FISH COUNT

FP - False Positives
Objects we should not have detected

TP - True Positives
Fish we correctly detected

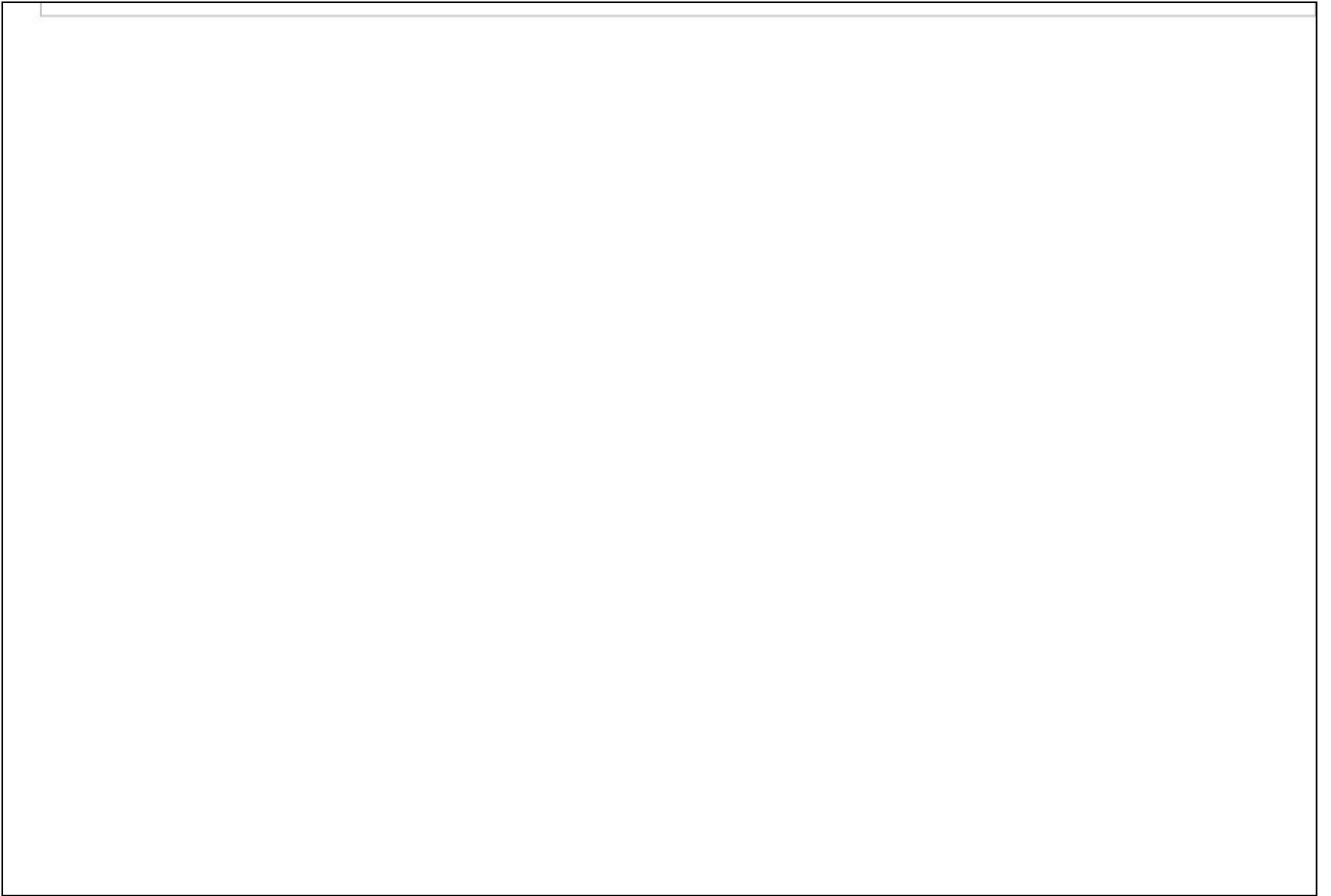
FN - False Negative
Fish we did not detect



Manual Count = TP+FN
The manually detected fish

Legend:

- **False Positives (FP):** the non-fish objects we incorrectly detected as fish (312 fish)
- **True Positives (TP):** the fish we correctly detected (4095 fish)
- **False Negatives (FN):** the fish we did not detect (1490 fish)
- **Manual Count = TP+FP:** all the fish that experts manually detected (5585 fish)

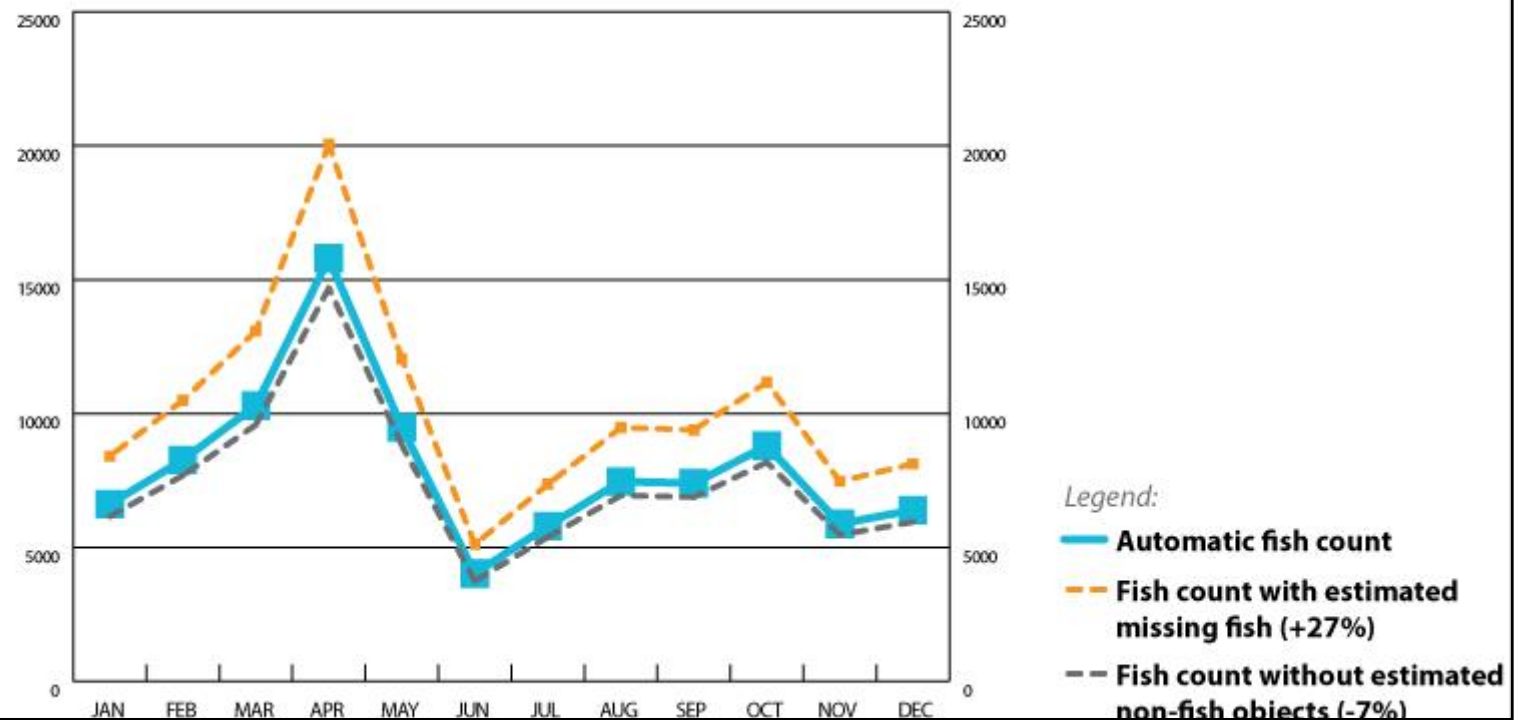


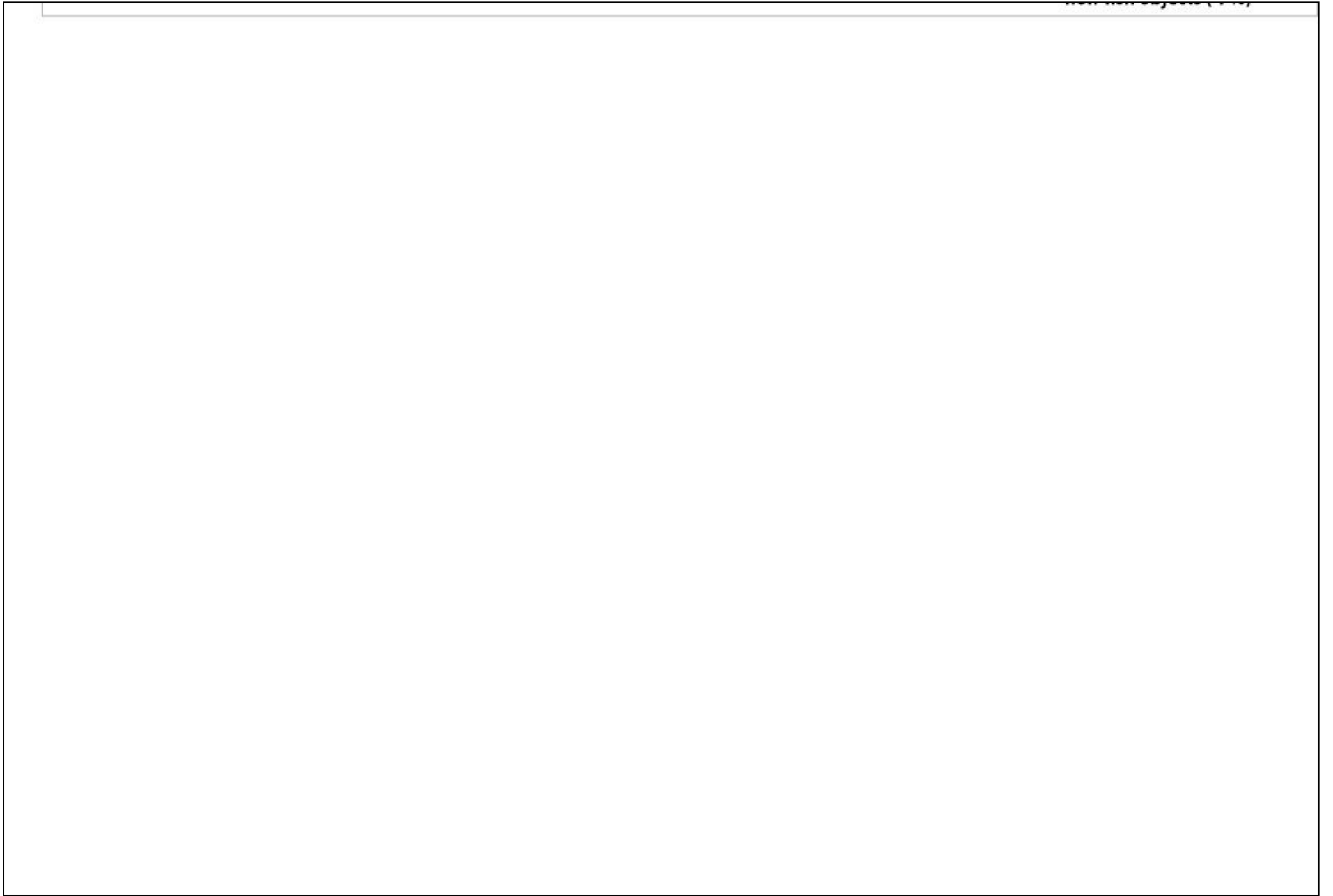
APPLYING THE VIDEO ANALYSIS TOOL TO A LARGE SET OF VIDEO



For the year 2011, we detected a total of 96 186 fish. The monthly fish counts are represented by the solid blue line below. During the evaluation, we observed that the automatic fish count was 27% lower than the manual fish count, and that 7% of the detected fish were non-fish objects. For instance, if the fish counts in 2011 were 27% higher, we would include the potentially missing fish. And we would obtain the dashed orange line below. And if the fish counts were 7% lower, we would potentially exclude the non-fish objects. And we would obtain the dashed grey line below.

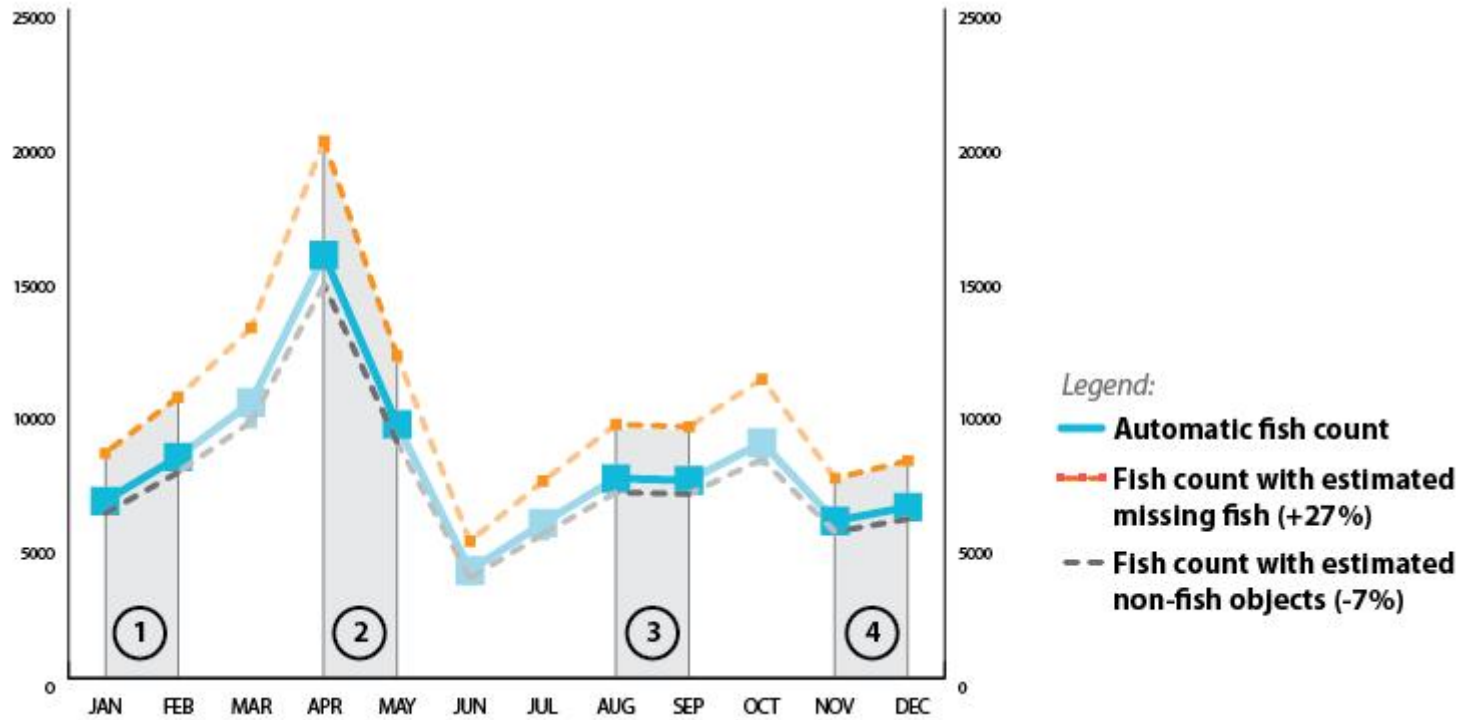
AUTOMATIC FISH COUNTS IN 2011





Task 2/3 - Questionnaire p.1/4

We focus on the four following trends that can be observed in the automatic fish counts for 2011.



8. What is your level of confidence in the above trends?

The trends observed in the automatic count can be different than the trends occurring for real in the ecosystem. This is particularly due to the errors introduced by the video analysis software.

For each trend identified above, please indicate how you would qualify the intensity of the trend (e.g., small or important increase). And please also indicate how confident you are in the fact that the observed trend is exactly the same in reality.

	What trend is it?	How likely is it that the trend is the same in reality?
Trend 1 - Jan. - Feb.	<input type="text"/>	<input type="text"/>
Trend 2 - Apr. - May	<input type="text"/>	<input type="text"/>
Trend 3 - Aug. - Sept.	<input type="text"/>	<input type="text"/>
Trend 4 - Nov. - Dec.	<input type="text"/>	<input type="text"/>

Do you have any remark about the difference between observed trends and the trends in reality?

Task 2/3 - Questionnaire p.2/4

To improve the accuracy of the video analysis software, Lucas has developed and tested several versions of the software. The different versions can produce different counts of fish, and different numbers of False Positives, True Positives and False Negatives.

Lucas has chosen the version of the software that produces the automatic count that is the closest to the manual count produced by experts, while having the fewest False Positives and False Negatives.

9. Please indicate if the following facts can explain the differences in numbers of False Positives, True Positives, and False Negatives that can be obtained for different versions of the software.

	This influences the number of False Positives	This influences the number of True Positives	This influences the number of False Negatives
Some versions of the software are more likely to detect non-fish objects (e.g., seaweed) as being a fish.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some versions of the software are more likely to correctly detect the fish in the videos.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some versions of the software are more likely to miss the detection of some fish in the videos.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Amongst the versions of the video analysis software, we compare the numbers of False Positives, True Positives, False Negatives. Do you think that it is possible to produce versions of the software that can produces the following results.

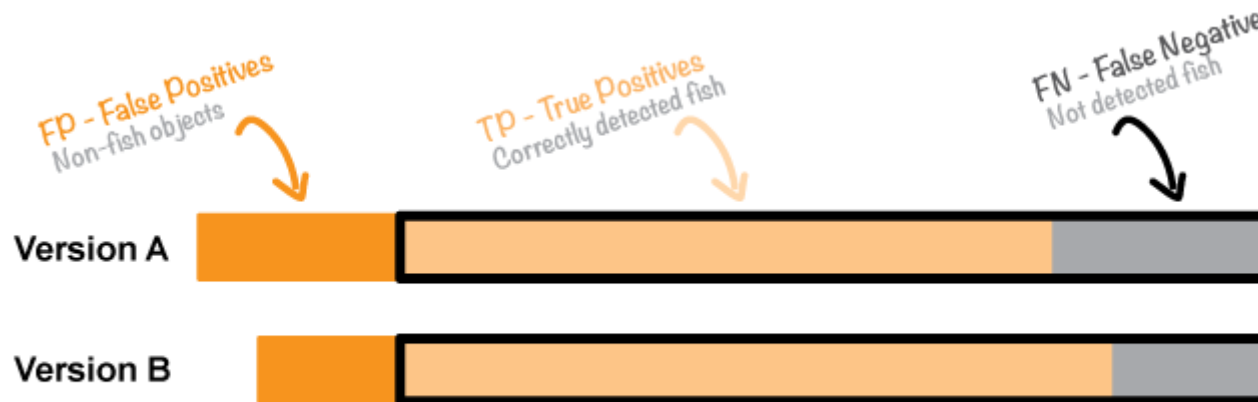
	A > B	A < B	A = B
We compare A) the number of False Positives (FP); and B) the number of False Negatives (FN). Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We compare A) the manual fish count; and B) the sum of True Positives (TP) and False Negatives (FN). Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We compare A) the manual fish count; and B) the automatic fish count. Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Task 2/3 - Questionnaire p.3/4

11. The image below shows the fish counts produced by 2 different versions of the video analysis software that Lucas has developed. Which is the most accurate version of the software?

Version A Version B I don't know

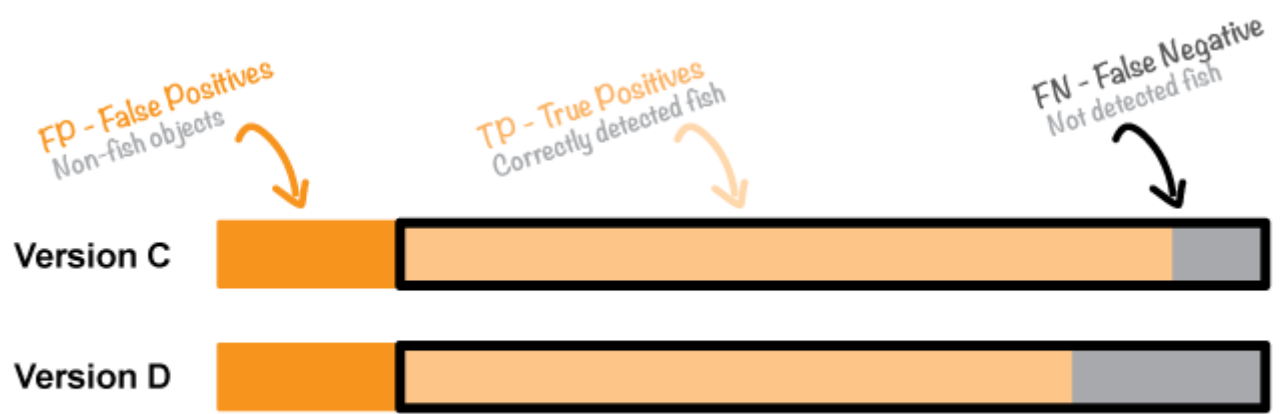
Why would you choose this version of the video analysis software?



12. The image below shows the fish counts produced by 2 different versions of the video analysis software that Lucas has developed. Which is the most accurate version of the software?

Version C Version D I don't know

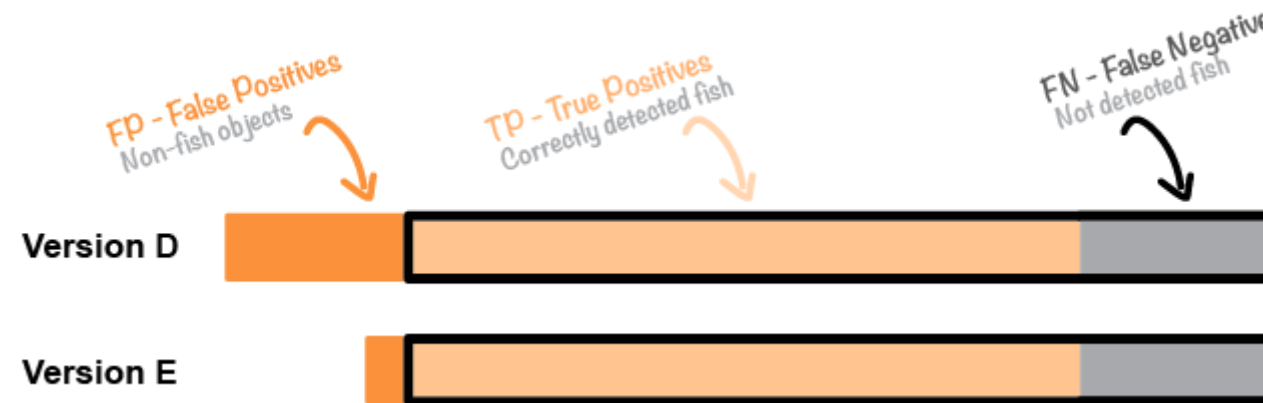
Why would you choose this version of the video analysis software?



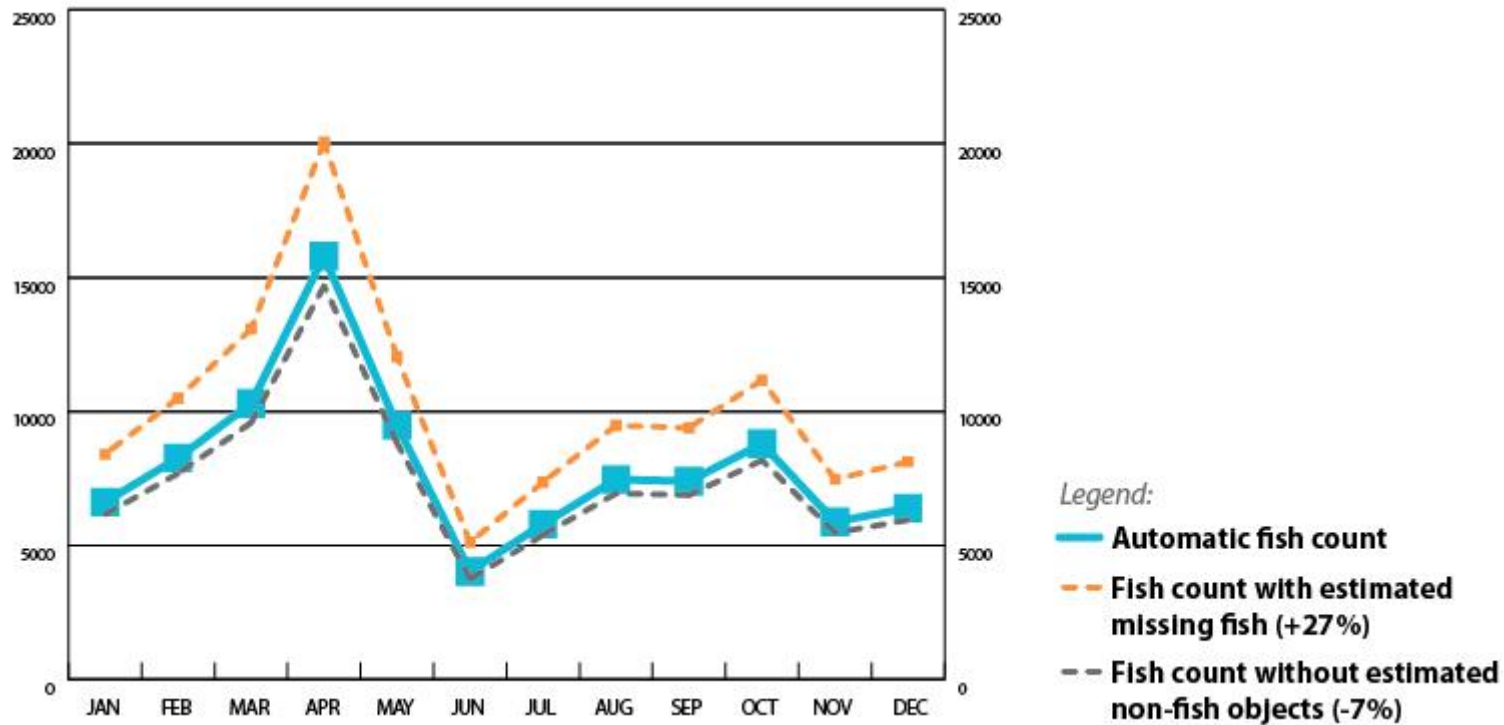
13. The image below shows the fish counts produced by 2 different versions of the video analysis software that Lucas has developed. Which is the most accurate version of the software?

Version D Version E I don't know

Why would you choose this version of the video analysis software?



The image below shows the fish counts for the videos in the year 2011 (the solid line). It also reports the proportion of missing fish (27%), as estimated from the fish counts for the videos for evaluation (the dashed line).



14. Which fish count would you choose to use for studying the variations of fish counts over time?

- I would choose the automatic count without a report of the potential errors (the solid blue line above).
- I would choose the automatic count with a report of potentially missing fish (the dashed orange line above).
- I would choose the automatic count with a report of potentially non-fish objects (the dashed grey line above).
- I would choose to use all of them and compare them.
- I don't know.

Why would you choose this?

Task 2/3 - Questionnaire p.4/4

15. Please indicate how much you agree with the following statements.

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
This software is suitable for counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software is transparent its about possible errors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Th software correctly handles the errors it produces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software uses an appropriate method for analyzing the videos and counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The given explanations contained enough information for understanding how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts produced by the software are as good as the fish counts that marine biology experts could produce.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts are trustworthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The accuracy of the software is good enough to be used for the scientific study of trends in fish abundance over time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would need more explanations about how the software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to use the video analysis software to count fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was interested in the explanations given about how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand how to handle the errors that were produced by the video analysis software and minimize their influence on my scientific research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how the errors produced by the video analysis software can influence the results of my scientific study of fish counts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understood the explanations given about the video analysis software.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have any other question? or any additional information you would need?



Task 3/3 - Evaluate the video analysis software

You have completed the 2nd task, and this is the last task.

Please explore a new version of the presentation of the software. It will give you more details about the errors produced by the video analysis.

After exploring the possible errors in the fish counts, please decide if this software is suitable for your needs.

When you are done with reading the presentation, please go to the next page.

Videos

Video Analysis

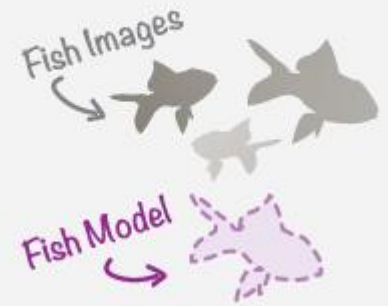
Fish Counts



OUR VIDEO COLLECTION

We need to count the fish that appear in a very large set of videos (e.g., around 24 000 videos per year). The software that can automatically detect fish is based on a model of the fish that was defined using examples of fish images.

For evaluation purposes, we asked marine biology experts to manually detect the fish in a small set of videos. To evaluate the accuracy of the video analysis software, we compare the manual count with the automatic fish count.



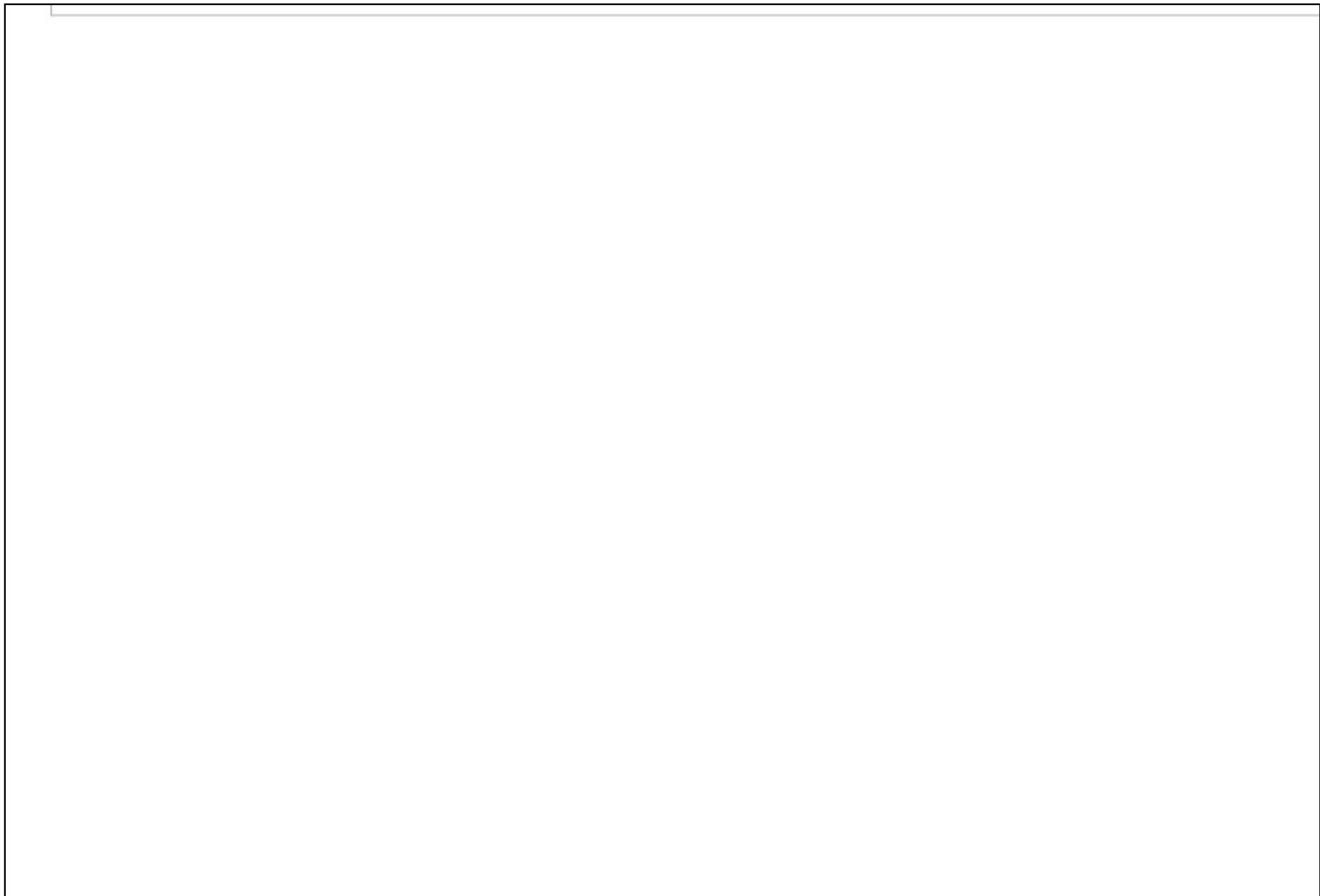
THE COLLECTIONS OF VIDEOS

Videos used for Evaluation
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204 videos



Videos in 2011
What we need to analyze

EXAMPLES OF FISH IMAGES IN THE COLLECTIONS



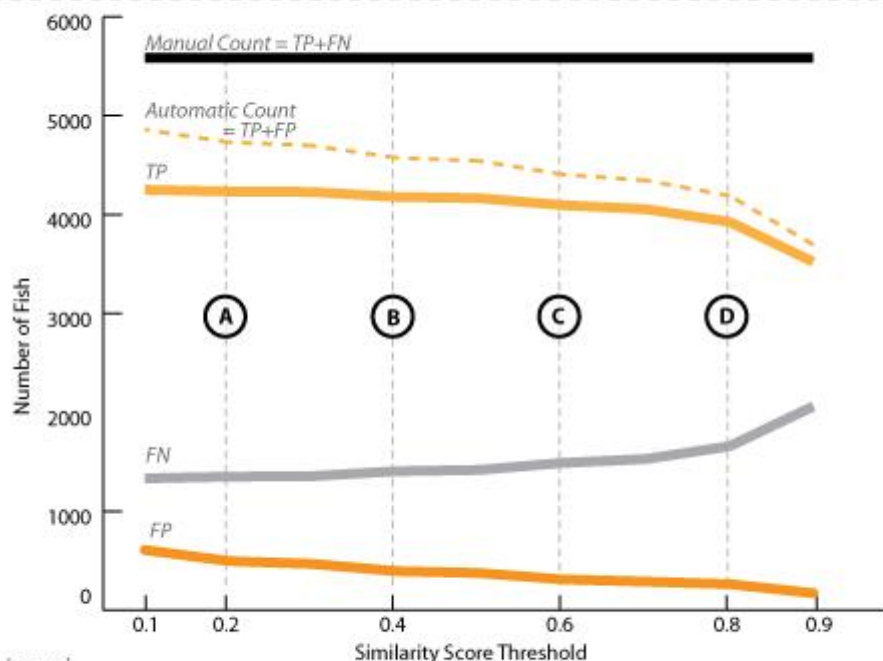
THE SIMILARITY SCORES



To further improve our automatic counts, we can calculate a Similarity Score that indicates how a fish image is similar to our fish model. We give a Similarity Score to all detected fish. And we use a Similarity Score threshold to discard the fish that are not similar enough to our model. The figures below show the fish counts and their accuracy at various thresholds.

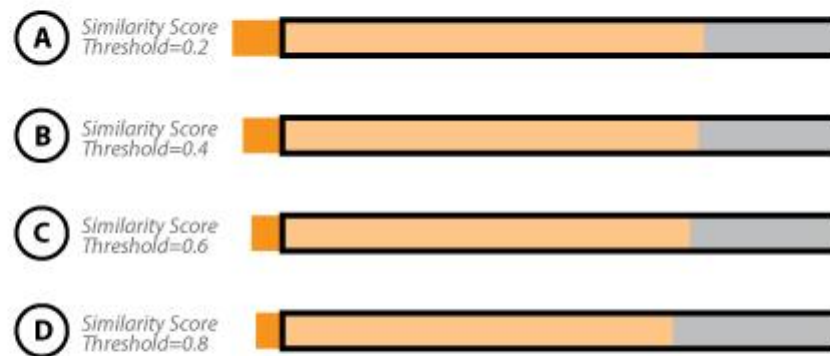


FISH COUNTS, TP, FP AND FN OVER SIMILARITY SCORE THRESHOLDS



Legend:
Manual Count = TP+FN
TP **FP** **FN** **Automatic Count = TP+FP**

ACCURACY OF FISH COUNTS OVER SIMILARITY SCORE THRESHOLDS



Legend:

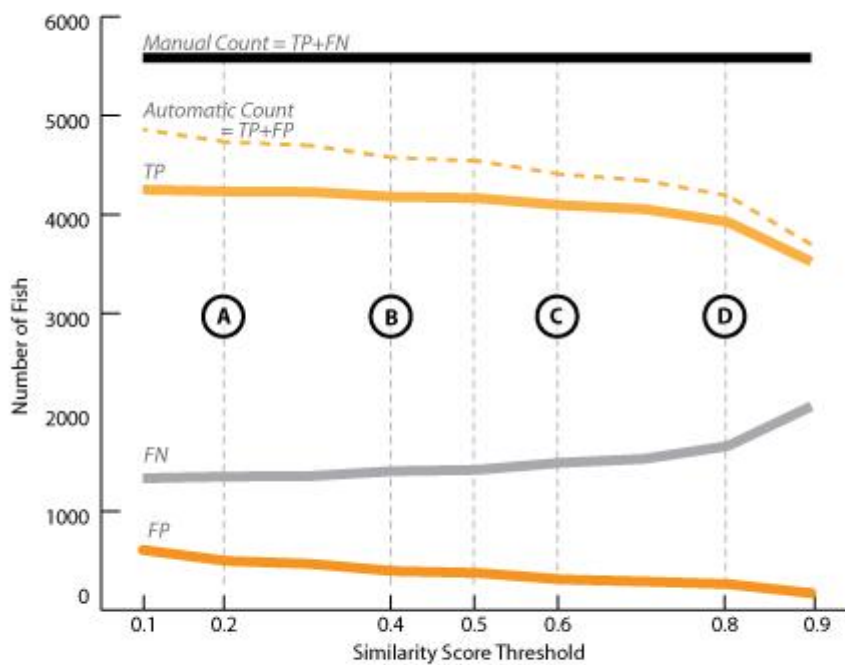
- **False Positives (FP):** the non-fish objects we incorrectly detected as fish
- **True Positives (TP):** the fish we correctly detected
- **False Negatives (FN):** the fish we did not detect
- Manual Count = TP+FP:** all the fish that experts manually detected



OUR COUNTS OF FISH

The counts of fish we detect can vary depending on the Similarity Score threshold we use. Lucas chooses to count the fish that have a Similarity Score above a threshold of 0.5, as shown by the solid blue line on the figure on the right. In this figure, the dashed blue lines indicates the fish counts that can be obtained with other thresholds than this one. The figure on the left shows what fish counts were obtained at these thresholds during the evaluation, i.e., from analyzing the 204 videos for evaluation.

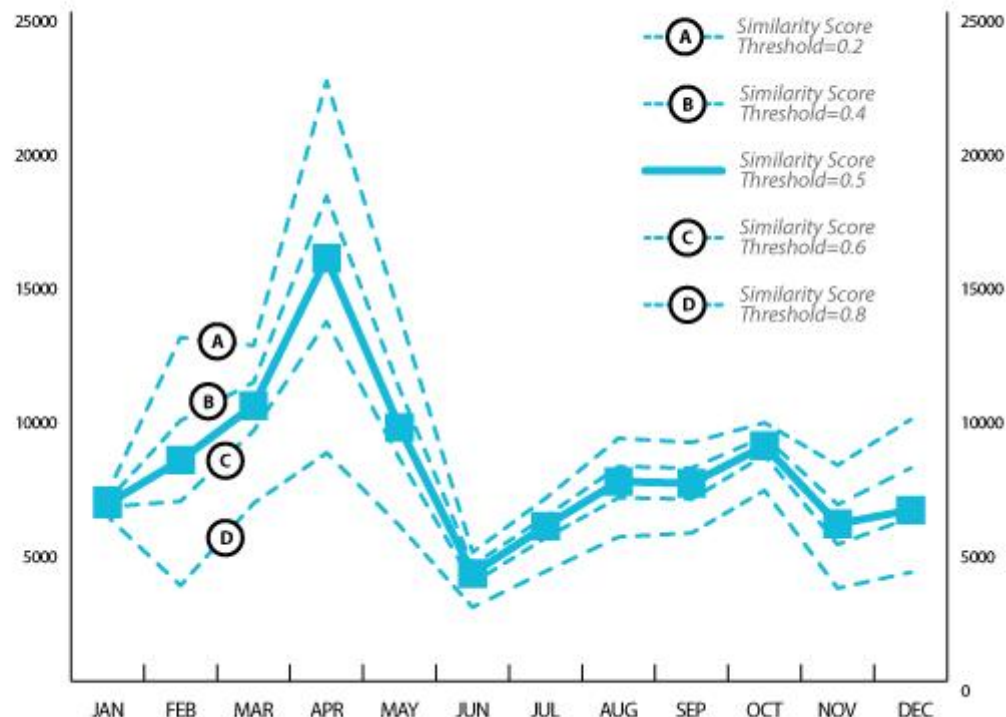
FISH COUNTS FOR EVALUATION OVER SIMILARITY SCORE THRESHOLDS

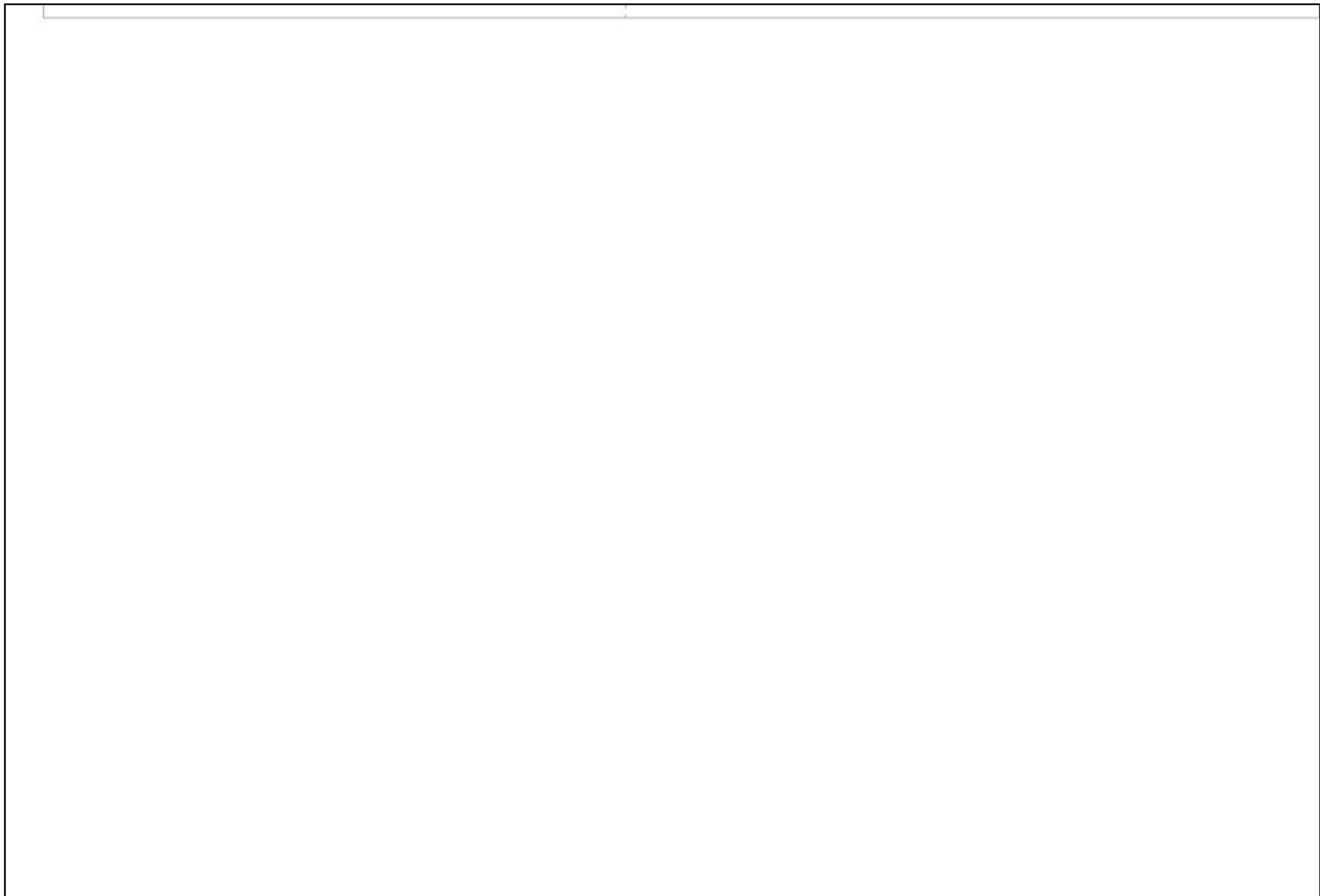


Legend:

- Manual Count = TP+FN
- TP
- FP
- FN
- Automatic Count = TP+FP

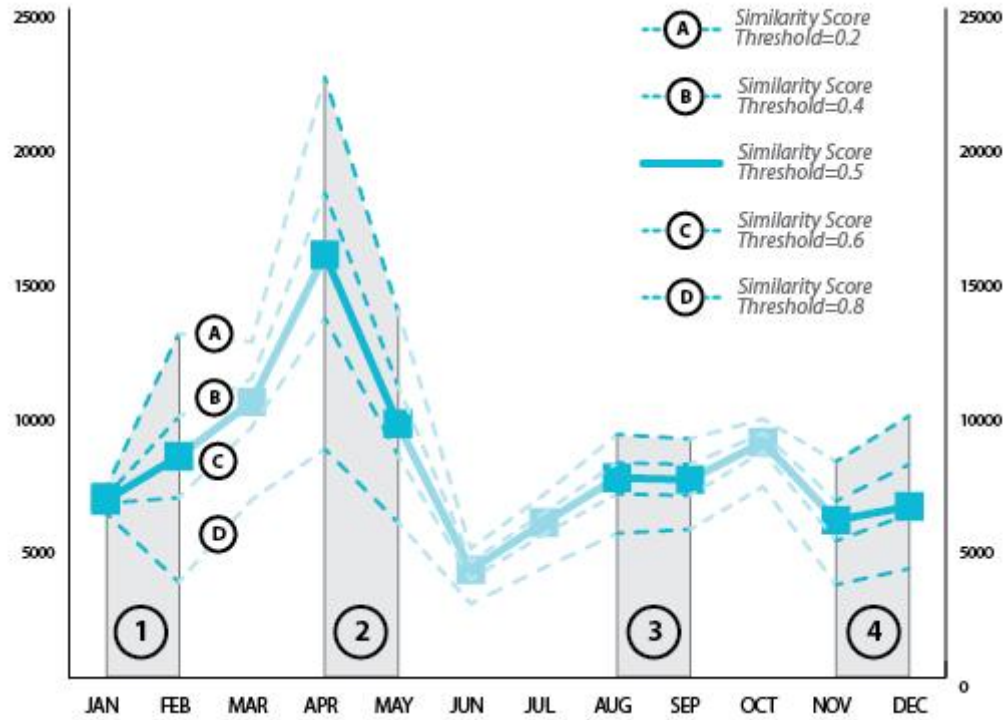
FISH COUNTS IN 2011 OVER SIMILARITY SCORE THRESHOLDS





Task 3/3 - Questionnaire p.1/4

We focus on the four following trends that can be observed in the automatic fish counts for 2011.



16. What is your level of confidence in the above trends?

The trends observed in the automatic count can be different than the trends occurring for real in the ecosystem. This is particularly due to the errors introduced by the video analysis software.

For each trend identified above, please indicate how you would qualify the intensity of the trend (e.g., small or important increase). And please also indicate how confident you are in the fact that the observed trend is exactly the same in reality.

	What trend is it?	How likely is it that the trend is the same in reality?
Trend 1 - Jan. - Feb.	<input type="text"/>	<input type="text"/>
Trend 2 - Apr. - May	<input type="text"/>	<input type="text"/>
Trend 3 - Aug. - Sept.	<input type="text"/>	<input type="text"/>
Trend 4 - Nov. - Dec.	<input type="text"/>	<input type="text"/>

Do you have any remark about the difference between observed trends and the trends in reality?

Task 3/3 - Questionnaire p.2/4

To improve the accuracy of the video analysis software, Lucas can choose an appropriate Similarity Score threshold. The different thresholds can produce different counts of fish, and different numbers of False Positives, True Positives and False Negatives.

Lucas has chosen the threshold that diminishes the number of errors while keeping the automatic fish count as close as possible to the manual fish count.

17. Please indicate if the following facts can explain the differences in numbers of False Positives, True Positives, and False Negatives that can be obtained for different Similarity Score thresholds.

	This influences the number of False Positives	This influences the number of True Positives	This influences the number of False Negatives
Some thresholds are more likely to discard non-fish objects (e.g., seaweed) that were detected as being fish.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some thresholds are more likely to include non-fish objects in the fish counts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some thresholds are more likely to incorrectly discard fish that were correctly detected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Amongst the Similarity Score threshold used, we compare the numbers of False Positives, True Positives, False Negatives. Do you that it is possible to find the following results.

	A > B	A < B	A = B
We compare A) the number of True Positives (TP) for a threshold = 0.2; and B) the number of True Positives (TP) for a threshold = 0.6. Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We compare A) the number of False Positives (FP) for a threshold = 0.2; and B) the number of False Positives (FP) for a threshold = 0.6. Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We compare A) the number of False Negatives (FN) for a threshold = 0.2; and B) the number of False Negatives (FN) for a threshold = 0.6. Is it possible that:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Task 3/3 - Questionnaire p.4/4

19. Please indicate how much you agree with the following statements.

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
This software is suitable for counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software is transparent its about possible errors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Th software correctly handles the errors it produces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The software uses an appropriate method for analyzing the videos and counting fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The given explanations contained enough information for understanding how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts produced by the software are as good as the fish counts that marine biology experts could produce.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic fish counts are trustworthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The accuracy of the software is good enough to be used for the scientific study of trends in fish abundance over time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would need more explanations about how the software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to use the video analysis software to count fish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was interested in the explanations given about how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand how to handle the errors that were produced by the video analysis software and minimize their influence on my scientific research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how the errors produced by the video analysis software can influence the results of my scientific study of fish counts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understood the explanations given about the video analysis software.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully understand how the video analysis software works.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have any other question? or any additional information you would need?