

## Problem/Opportunity Background

### 1. Problem

- a. What is the nature of the problem?
  - i. Given a spectrograph that can contain meteors, analyze the spectrograph to determine if any meteors are captured by it, then highlight where they are within the spectrograph (object/pattern detection within images)
- b. Can the problem be solved?
  - i. Yes!
- c. What are the effects of the problem?
  - i. A human is required to spend time analyzing spectrographs to determine if a meteor was captured by it (this could be anywhere from several seconds to several minutes)
- d. How long has the problem existed?
  - i. At least a year (unknown how long the Radio Meteor Zoo has been running)
- e. How severe is the problem?
  - i. This problem has low severity, there are no inherent negative results of this problem existing, other than the requirement for human interaction
- f. Where does the problem occur?
  - i. Online within the Zooniverse website
- g. When did the problem develop?
  - i. At least a year ago (unknown how long the Radio Meteor Zoo has been running)
- h. What caused the problem?
  - i. A lack of accuracy of current technology, due to low accuracy, machines could not be used to accurately identify meteors within spectrographs
- i. Who is affected by the problem?
  - i. Any participant of the Radio Meteor Zoo, Zooniverse, and those who collect and analyze the provided spectrographs
- j. How many people are affected by the problem?
  - i. Unknown
- k. Who will benefit from the solution?
  - i. Any participant of the Radio Meteor Zoo, Zooniverse, and those who collect and analyze the provided spectrographs
- l. Who else is involved in solving the problem?
  - i. Professor Antunes
  - ii. Zooniverse data people
- m. What is needed to solve the problem?
  - i. 10s of thousands of points of data (spectrographs)
  - ii. A machine to generate the machine learning model

- n. Other questions originated by the student.
  - i. None at the moment
- 2. Opportunity
  - a. What is the nature of the opportunity?
    - i. Educational and personal. The opportunity would allow me to create a Senior Design project and have fun while creating it.
  - b. What benefits are generated by the opportunity?
    - i. Obtaining a good grade for my Senior Design project
    - ii. Learning how to create and refine a machine learning model
    - iii. (Hopefully) introduce a tool that can reduce the amount of time required by humans for the Radio Meteor Zoo project
  - c. Who benefits from the opportunity
    - i. Zooniverse
    - ii. Me
  - d. How long has the opportunity existed?
    - i. At least a year (unknown how long the Radio Meteor Zoo has been running)
  - e. Why does the opportunity exist?
    - i. A lack of accuracy of current technology, due to low accuracy, machines could not be used to accurately identify meteors within spectrographs
    - ii. An interest in creating a solution for an interesting problem
  - f. Who else seeks to take advantage of the opportunity?
    - i. Any participant of the Radio Meteor Zoo, Zooniverse, and those who collect and analyze the provided spectrographs
  - g. Other questions originated by the student.
    - i. None at the moment