

# *EAS 504*

# *ASSIGNMENT-9*

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### **General Information: -**

The following Lecture was taken by Mr. Arun Venkatachar and Ms. Sashi Obilisetty. Arun works as a Vice President in Research & Development division of Synopsis and his team works on multiple Machine learning and Artificial Intelligence aspects of the project.

### **Base Questions: -**

#### **1.) What are principal uses of data sciences in this domain?**

**Ans)** Following are principal uses of data science in this domain:

- 1. AI Chips:** - Any data science related task that uses deep learning/ AI related algorithms are very computation intensive and thus consumes a lot of power. Companies are trying to produce AI chips that are efficient enough to optimize this cost.
- 2. Data-Centres & Edge:** - Data Centres are another example of high-power consumption due to its nature of data intensive computation. To optimize these costs, companies are trying to make it cost efficient using data science techniques.
- 3. Automation in Vehicles:** - Companies are trying to implement more and more automation techniques in passenger vehicles, one very good example is self-driving cars. These features require implementation of lot of data-science techniques. For e.g. Synopsis designs AI chips for Tesla for making the car more intelligent.
- 4. Internet of Things (IoT):** - With the number of smart devices, being used by humans on daily basis, is on rise, a lot of data is getting generated and this brings in the implementation of data science techniques in this domain.
- 5. 5G:** - holds huge potential with the use AI chips for smart distribution of bandwidth among users.

#### **2.) How are data and computing related methods used in the organizational workflow?**

**Ans)** Following text will give an idea about how data and computing related methods are used in organizational workflow: -

- Silicon chips, used in earlier late 90's, were not efficient enough from the perspective of power consumption.
- With time as data intensive computations increased exponentially, need for smart chips, enabled with AI technology, increased that consumes less power and at the time uses the available power very efficiently.
- Synopsis manufactures such AI chips that are used by many other companies, in turn, with an objective of implementing data science related technologies for e.g. self-driving cars being manufacture by Tesla uses AI chips manufactured by Synopsis.
- Another example of data related methods used in organizational workflow is of Data Centres. They implement data science techniques to optimize the data intensive process, available power so as to use available resources efficiently.

### 3.) What data science related skills and technologies are commonly used in this sector?

**Ans)** The data science related skills and technologies commonly used in this sector are as follows: -

- Electronic Design Automation Industry (EDA) has a thorough implementation of Machine Learning.
- Big Data Technologies are used to optimize the data intensive processes in Data Centres.
- Synopsis uses Regression API, Classification API, Clustering API for different type of problems.
- Speaker also mentioned about VC-Statics, this is a tool for un-supervised learning.
- Computer Vision techniques are also used a lot by the Synopsis for prediction and labeling problems.

### 4.) What are the primary opportunities for growth?

**Ans)** Speaker explained us how chips implement Artificial Intelligence to make them smarter. Thus, these hardware needs software to make them more efficient, this involves lot of machine learning and data science techniques being implemented on day to day basis. This is one of the primary growth opportunities in this domain. Another area is that speaker talked about is making these regression, classification and clustering API's more efficient and reliable.

Other Questions with respect to this Lecture: -

**Ques.)** In addition, describe two challenges in applying machine learning approaches to this domain and identify two problems that are good candidates for applying ML approaches?

**Ans.)** Two Challenges: -

- Data diversity and data quantity is required to make sure that machine learning model being trained on the available data is reliable. Getting such data is a challenge as it is not available always.
- Another challenge that people face in this industry is how to decide whether a given problem is good candidate to apply machine learning and data science techniques and whether that problem should be pursued or not.

Two problems that are good candidates for applying ML approaches: -

- **VC Statics** is tool developed by Synopsis that implements unsupervised learning techniques to cluster errors arising from auto-suggestion tools so as to reduce the verification time.
- **PrimeTimeEco (To automate gate level design):** -This tool implements supervised learning technique (classification model) to validate the gate level design and connections and reduce the verification time from 6 hours to just 1 hour.