Data Collection

Part-II

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Outlines…

2. Data Labeling

- THE NEXT TASK AFTER DATA ACQUISITION IS TO LABEL THE DATA.
- THERE ARE MANY CATEGORIES OF DATA LABELING:
  1. Use Existing labeling
  2. Crowd-based
  3. Weak-labeling

2. Data Labeling

1. Use Existing labeling:
   - It exploits the existing label to label the unlabeled data e.g. semi-supervised learning
2. Crowd-based:
   - Crowdsourcing approach get utilized to label the individual samples. e.g Active learning
3. Weak-labeling:
   - It is expensive approach for labeling. Data are labeled with less than perfect labels (weak label)

2.1 Utilization of Existing Labels

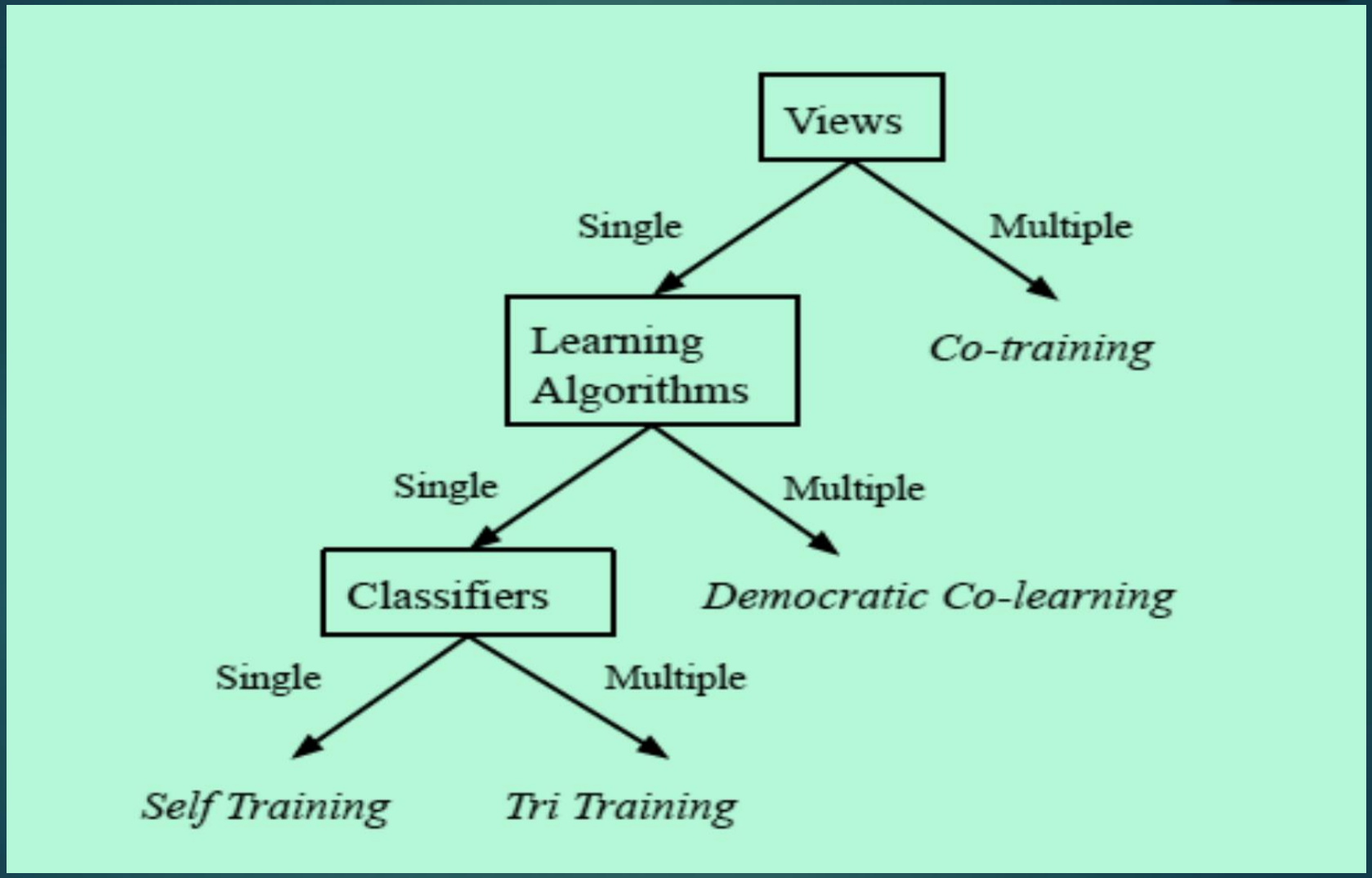
- SUPERVISED AND SEMI-SUPERVISED MACHINE LEARNING ALGORITHM CAN DIRECTLY APPLIED FOR LABELING THE DATA.
- IN SUPERVISED LEARNING:
  - Classification: to predict the categorical labels using existing labels.
  - Regression: To predict the continuous labels using existing labels.
- IN SEMI-SUPERVISED:
  - Inductive learning
  - Transductive learning

Classification of Data Labeling Techniques

Category	Approach	Machine learning task	Data types
Use Existing Labels	Self-labeled	classification	all
		regression	all
	Label propagation	classification	graph
Crowd-based	Active learning	classification	all
		regression	all
	Semi-supervised+Active learning	classification	text
			image
			graph
	Crowdsourcing	classification	all
		regression	all
Weak supervision	Data programming	classification	all
	Fact extraction	classification	text

- Roh, Yuji, Geon Heo, and Steven Euijong Whang. "A survey on data collection for machine learning: a big data-ai integration perspective." *IEEE Transactions on Knowledge and Data Engineering* (2019).

Classification of Semi-Supervised Learning Techniques



- Roh, Yuji, Geon Heo, and Steven Euijong Whang. "A survey on data collection for machine learning: a big data-ai integration perspective." *IEEE Transactions on Knowledge and Data Engineering* (2019).

2.2 Crowd-based Techniques

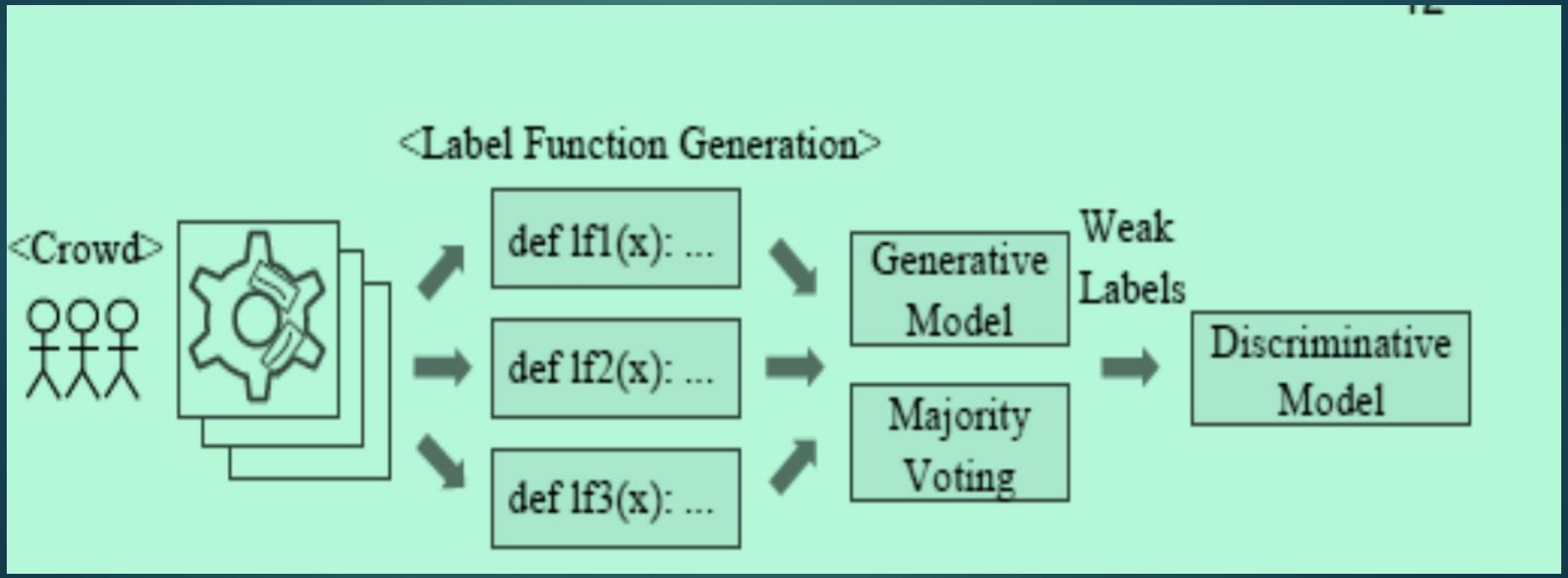
- THERE ARE TWO CATEGORIES IN CROWD-BASED TECHNIQUES:
- ACTIVE LEARNING: IT SELECTS THE MOST INTERESTING SAMPLES TO CROWD FOR LABELING. I HAS HUMAN IN LOOP FOR THE LABELING.
- CROWDSOURCING: IT UTILIZES THE HUMAN RESOURCE FOR LABELING THE DATA WHICH MAY NOT BE THE EXPERT OF THE DOMAIN.
  - Challenges: Quality Control, scalability, User interaction

2.3 Weak Supervision

- Automatically generated labels which may not be good quality of labels as crowdsourcing.
- This type of labeling is feasible for large amount of data.
- In the case of crowdsourcing, its become infeasible to label the data.
- There are two categories:
  1. Data Programing
  2. Fact extraction

2.3 Weak Supervision

- **Data Programming:**
  - It utilizes the multiple labeling function rather than one labeling function.
  - Flowchart of Data Programming:



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2.3 Weak Supervision

- **Fact Extraction:**
- **Fact-extraction is utilized for labeling.**
- **It is better than manual labeling.**

Task	Techniques
Improve Data	Data Clearing
	Relabeling
Improve model	Robust Against Noise
	Transfer Learning

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Thank You