**Summaries**

**Summary 1:**

This text is talking about the AI’s usage to change the materials’ properties.

If you apply a bit of strain to semiconductors. By doing this, it can deform arrangement of atoms and, due to this, change its properties.

Researchers at MIT, in Russia & Singapore found ways to use AI to predict and control those changes.

They already incorporated elastic strain to silicon CPU chips -> those strains allow the electrons to move faster through the material. -> The chip, then, gains performance.

The strain is applied in 6 different ways (in our 3 dimensions and, in each, a int-out-sideways) and with nearly infinite gradations of temperature -> it’s impossible to just “try and see”

Machine learning has a systematic way to explore possibilities to get a given set of properties. With the help of ML, you can get very accurate methods to effectively reduce the complexity of those gradations. It opens possibilities to create new materials that are precisely tuned for a certain use.

Diamond is a great semiconductor because electricity can move freely around the atoms. It’s ideal for high-frequency electronic devices and could perform a hundred thousand times better than the same semiconductor made of Silicon.

**Summary 2:**

MIT researchers developed a new cryptocurrency that reduces the data users need to join the network and verify the transactions to up to 99%, this network’s scalability is then better than any other one.

Cryptocurrencies are networks built on the blockchain. It does mean that they’re decentralized and no banks, organizations nor governments manage them.

The storage of data can slow the process or make the computation impractical. The idea of those networks is to download a fraction of the total transaction data.

Each block of data contains a timestamp, its location and its hash.

With traditional cryptocurrencies, users compete to solve equations that validate blocks.

As the network scales, the processing time is slowing down, it’d be better to use a concept that efficiently verify blocks of data.

In our concept, each block contains some key information and has a new certificate verification information.

To reduce the storage, we add a new scheme, named “Sharding”. It divides the transaction data into smaller pieces.

A more secure way is to use the binary Merkle tree, where you have a single top node that has two children and each of those children has 2 children. The top node has a single hash (named root hash). In its way, to verify a transaction, you combine two children nodes to get the parent one. Bottom to up.

**Summary 3:**

Using the theory of numbers and other concepts to fortify the encryption. The goal is to develop more efficient encryption techniques that scales on complex computations on large datasets where multiple parties can share data but still remains the information private.

A better encryption means an ensure privacy while doing something useful from encrypted data.

In the future, when we will have ultrafast quantum computers, we could use those to go through thoughest encryption algorithms.

We can use fully homomorphic encryption but original was too expensive to be practical, they worked on an algorithm to carry out complex computations on encrypted data.

**Summary 4:**

Pharmaceutical companies are wasting a lot of time testing potential drugs.

Swanson, a Computer Science student work on a project which is to feed a computer information about chemical compounds that could have worked (or not) as drugs.

With this project, the machine could learn to predict new kinds of drugs and then save money and time.

The first experience of Swanson was an app to identify breasts cancers based on mammogram images. It is still used but for checking the risks about getting one.

He asked to join Barzilay’s lab cuz she’d been through a similar scare (Swanson found a lump above his collarbone one day).