

## Episode -14

### Artificial Intelligence and the art of Handwriting Recognition

**Script: R. S. Yadav**

**Transcription: Sukanya Datta**

**Concept and Coordination: B.K. Tyagi**

### COUNTERFEITING THE SIGNATURE

Documentation of knowledge is inextricably linked to the very early days of human history. However, we have not yet been able to decipher the script used by the people of Mohenjodaro as well as many other proto-civilizations. On the other hand, explosive developments in science and technology are taking us to new heights. While our quest to answer the when, how, why and where leads us to explore new vistas there are those whose cunning and criminal nature make them the masters who exploit the same. One technique that such people use is counterfeiting the signature or even flawlessly mimicking the handwriting of others. They use these counterfeit documents to benefit unethically.

Till recently, the answer to these nefarious activities lay in forensics laboratories. Unfortunately, although the process itself was long and tedious, the net results were often incorrect. A ray of hope is that artificial intelligence in handwriting recognition is emerging as a dependable new tool. In this episode you will learn how smart technology at your service is providing a solution to the vexatious issue of handwriting frauds.

#### **Characters**

**Ramdayal: (55 years)**

**Pratap: (20 years. Ramdayal's son and student)**

**Santosh: (50 years. Ramdayal's wife)**

**Rajsri : (35 years. Advocate/Expert)**

**Anand: (35 years. Property dealer)**

**Ramakrishna: (50 years)**

**Shyam (Voice from the other side)**

**Autowala:**

**Scene 1: Middle Class family. Sounds of activities inside the room. TV. Sounds of a bell (maybe puja bell not doorbell). Soft sounds.**

**Santosh:** EH! Have all of you gone quite deaf...why have you turned the TV sound so high? Lower the sound volume please. Let me carry out my puja in peace. I really do not know when Goddess Lakshmi will smile upon us.

**Pratap:** Mummy is always trying to please the Lord...but I tell you Goddess Lakshmi cannot be appeased in this manner...that too in a rented home. **(Laughs)**

*TV volume is lowered. Puja bell is heard.*

**Santosh:** *Sings hymn.*

### **Hymn fades**

**Ramdayal:** If your puja is over, please can you make me a cup of tea?

**Santosh:** Why don't you enter the kitchen once in a while? Do you even know how the housework gets done?

**Ramdayal:** I can do that but then you will crib that I have messed up your clean kitchen.

**Santosh:** If you create a mess you can clean it up too, can't you?

**Ramdayal:** Now will you keep accusing me or will you make me that cup of tea...you know that my salary will be deducted if I reach office late.

**Pratap:** Papa, I will make tea for you today **(laughs)**. That too with spices and ginger!

**Ramdayal:** Let it be Pratap...I am not sure that you will not end up adding salt instead of sugar to the tea. You go and finish your studies.

*Sounds from the kitchen. Pots, pans, cups, plates utensils rattling etc.*

**Pratap:** Hear that Papa? Mummy is no less than a robot when it comes to doing household chores...she is ready with tea and breakfast almost as soon as you asked for it!

**Ramdayal:** I know that. That is why I prevented you from volunteering...I know how swiftly and perfectly she carries out all the work. No wonder womenfolk have been compared to Goddess Lakshmi.

**Pratap:** Papa...you were cribbing just now and what a volte face when you saw Mummy! **(Laughs)**

**Ramdayal:** You Mummy is no less than a lioness **(Laughs)**

*Sounds of cups and plates being placed on table.*

**Santosh:** Your tea is ready...now will you come to the table or must I bring the cup to your lips?

**Pratap:** Don't worry Mummy...even that is being arranged. Do you know because of the fears of the Corona virus, people have designed robots to serve in the restaurants? So no fear of Covid 19 infection; not the need to pay wages.

**Santosh:** Was life any better than a machine? Running here and there all the time and now, robots!

**Ramdayal:** **(sipping tea)** Ah! Wonderful. I tell you Santosh. I just don't feel like drinking tea anywhere else.

**Santosh** **(sitting down on a chair):** I forgot to tell you. The Landlord called yesterday about the rent.

**Ramdayal:** **(Sighs):** The same story every month. And this lockdown has really crippled everything. Business is slow. So my employer too is delaying paying our wages.

**Pratap:** Our next college session starts next month...we will have to pay the fees.

**Santosh:** Expenses...expenses. And the spiralling costs of everything. On top of that we have this deadly virus. It is the straw that broke the camel's back. It has locked down everyone at home.

**Pratap:** This situation will persist till we get a vaccine.

Santosh: Can't we get a home of our home...we can apply for a loan.

**Pratap:** Yes, Papa. That way this issue of paying rent every month will not trouble us anymore.

**Santosh:** And we will not have to face the attitude the Landlord throws around...as if he has hosted us for free.

**Ramdayal:** You are correct Santosh...but...**(Sighs)**

**Santosh:** What is this "but?"

**Ramdayal:** From where will I lay my hands on such a large amount? Even if I add all my savings and the amount in my PPF...it will not suffice to cover even a fraction of the cost.

**Pratap:** There are so many advertisements in newspapers about easy home loans. The Pradhan Mantri Awas Yojana offers discounts on the interest too.

**Santosh:** Son...your father will happily spend the rest of his days in a rented house. God bless the Landlord who has let us remain here for ten years.

**Ramdayal:** At least in this aspect we have been lucky.

**Santosh:** Look, we have to make efforts or else how will we succeed? If necessary I do not mind parting with my jewellery to help pay for the house..

**Pratap:** Remember the saying that we need to pull up our socks if we aim for success.  
(Laughs)

**Santosh:** We will celebrate the festive season under our own roof this year.

**Papa:** My friend knows a Property- dealer...he deals in buying-selling and renting out property. Shall we fix an appointment with him this Sunday?

**Ramdayal:** Well, you two are in the majority...so...OK. What is his name?

**Pratap:** I'll ring and find out.

*Punches in the number. Outgoing caller tune.*

**Pratap:** Hello Shyam. How are you?

**From the other side:** **Hi! You are calling so early...is everything OK?**

**Pratap:** No, no...everything is fine. Listen, you once told me you knew a Property-dealer. What is his name?

**From the other side:** **Laughs. What do you want to buy? Or do you intend to give up studies and take up Brokerage?**

**Pratap:** It isn't anything like that at all. My father would like to meet him this Sunday. Can you please let me know his name? And can you give me his mobile number. You can Whatsapp or message me the address of his estate office and contact details. OK. Bye.

**Santosh:** The sooner the better...you did well not to waste time, my son.

**Pratap:** Brokers are all worshippers of goddess Lakshmi: the Goddess of Wealth...he too will not delay to advance a business proposition. (Laughs)

*Sound of a SMS arriving on mobile*

**Pratap:** Papa, the message is from Shyam. The Property dealer's name is Anand. Shyam has provided all contact details as well.

**Santosh:** Well, that is propitious name...hope he can help us conclude the deal.

**Ramdayal:** Santosh beware property-dealers can be crooked! We do not know what sort of a dealer he is...I am simply afraid of running into quarrelsome ones or ones who will land us in trouble.

**Santosh:** Look...in case there is a house we like...let us finalize the deal. As far as landing in trouble is concerned...we will check all the official documents carefully.

**Ramdayal:** That is alright...but we donot have enough experience in these things.

**Pratap:** God helps them who help themselves. We will pay. The deed will be registered. We will take possession. Where is the fraudulence in all these? Also, science has advanced so much that most criminals are caught anyway!

**Santosh:** Let us focus on the positive. Our one dream. A home of our own. **(Laughs)**

*Scene 2: Sunday. Anand Estate Office.*

**Pratap:** Hurry up Papa. Our appointment with Anand is at 11 AM.

**Ramdayal:** Get your scooter on the road, son.

*Sound of scooter being kicked/Engine roars to life.*

**Pratap:** Papa, The scooter is ready. Don't forget your bag and helmet.

**Ramdayal:** OK I am seated safely. Let's go. Pay attention to the traffic rules when driving. They are pretty strict these days.

**Pratap:** Don't worry, Papa. I have checked out my route on Google.

**Ramdayal:** Look where technology has reached....Look...look there is the signboard saying Anand Estate Office. Drive down by the side of the gate and then stop.

*Sound of the scooter stopping and being parked. Door opens.*

**Ramdayal:** Namaste. I am Dayal.

**Anand:** Please come in Uncle, I have been waiting for you.

**Pratap:** Hello! I am Shyam. My friend Shyam told me about you.

**Anand:** Please come in. Welcome...(Raising his voice) Get cold drinks for Uncleji.

**Ramdayal:** Ananad...listen...There is no need to go into so much trouble. We ate before we started out from home.

**Anand:** What are you saying? This is the first time you have come to my office...and that too with my younger brother, Pratap.

*Sounds of tinkling glass etc.*

**Pratap:** **(Taking the cold drink.)** Such formality wasn't really necessary.

**Anand:** So, tell me Uncle...what are you looking for?

**Ramdayal:** Son...can you get us a nice home so that we can say goodbye forever to staying in rented accommodation?

**Anand:** Have you given any thought about the budget?

**Ramdayal:** Well...with my savings and PPF ...we can manange a sum of 15 lakhs.

**Anand:** Uncle...the amount is not enough to secure even an one-room house.

**Pratap:** Please do not dishearten us...we have come to you with a lot of hope.

**Anand:** Uncle, may I take a look at your salary slip?

**Pratap:** Here, I have it.

**Anand:** Hmm...you get a consolidated sum of Rs 20,000 and you are over 55 years of age. Even if you take a loan from a bank that will still not be enough to pay for a 2-roomed house.

**Pratap:** You are such a well-known property-dealer. Everyone knows your name. Can't you do anything?

Anand: Ah! It reminds me. I have the papers for a property. It is in a nice location. Construction is complete. I'll take you for inspection...If you like it...well, we will see.

***Scene 3: Car start. Sounds of a busy market place. Horn etc.***

**Pratap:** This is Anand Lok area!

**Ramdayal:** Looks like a nice, clean and green colony.

**Anand:** This colony is in great demand. However, the Real estate business is in the doldrums that is why the rates are so reasonable. ***(Sounds of a door being opened)*** Look Uncle...see how large the drawing room is...and there are two big bedrooms with attached bathrooms too.

**Pratap:** And the kitchen is pretty large as well.

**Ramdayal:** We like the house...what is the amount the party is demanding for it?

**Anand:** The party is under me and in immediate need of money. I hold the Power of attorney for this property. The owner has given me all the rights. You decide if you want to buy it or not. The market rate is between 65-70 lakhs; not a penny less. However, I will give it to you at a cheap rate.

**Pratap:** I really like this house, Papa. It has large balconies as well...let's conclude the deal and make it final.

**Anand:** Yes...this is the current price. It may happen that today itself a second party arrives and pays the Booking Price upfront. If you look at its location and the quality of construction you will agree that this is likely. This property will not remain in the market for very long. It will be snapped up.

**Pratap:** Brother Anand...this house is going to be ours...Papa...say you agree.

**Ramdayal:** If my kid likes it...then I like it too. Here Anand. This is the advance amount I had brought with me as Booking price.

**Anand:** Thank you Uncle. Consider that the house is yours. I will get you all the papers and get the registration done within the month.

**Ramdayal:** Anand, make sure all the papers are authentic and complete.

**Anand:** Don't worry. I am here. If you like, I can give you the keys. You can start staying here from tomorrow.

*Scene 4. One month later. The Registration process is completed by Anand who uses the Power of attorney.*

*Ramdayal and his family enter to offer house warming puja.*

**Santosh:** Praise the Lord. Today we are entering our own home.

**Pratap:** The credit goes to you. Paap was willing to remain in a rented home all his life.

**Ramdayal:** If the Goddess Lakshmi is pleased then all efforts are rewarded. **(Laughs)**

**Santosh:** One's own home is one's own home after all...I really slept well under our own roof.

**Pratap:** You know what they say, Mummy. Home Sweet Home. My dream home. **(Laughs)**

*Sounds of a car stopping. Door bell rings.*

**Santosh:** Who can it be...so early in the morning?

**Pratap:** I'll check, Ma.

*Footsteps. Door opens.*

**Anand:** Uncle had called. He wanted the documents to the house.

**Ramdayal:** Come in Annad. Have you got the Registration papers?

**Santosh:** Anand, you got us a really nice home...I slept very well last night.

**Anand:** Aunty...all this years it was just a house...you made it a home. (**Laughs**)

**Ramdayal: Santosh (Together):** Rightly said. I had called to get the Court papers.

**Anand:** Why do you worry? I have the photocopies and you have possession. So what are you scared about?

**Ramdayal:** I need to submit the papers in office so that the bank loan EMI maybe deducted from my salary. Now tell me what would you like to drink?

**Anand:** Nothing, Thank you. I must go...I have some work to attend to. I will drop in later. Bye.

**Everyone:** Take care. Bye.

*Change of scene.*

*Three months later normal happy sounds of movements inside the house.*

**Ramkrishna: (muttering to himself):** Finally I am in Delhi...I should make some time and check out the house too. Autowala...Hey auto...auto. Will you take me to Anand Lok?

**Autowala:** Yes sahib...take your seat.

*Sound of auto starting. Sounds on road. Horns etc.*

**Ramkrishna:** Stop...stop...we have arrived. Stop near that house, please.

*Auto stops.*

**Pratap:** Papa, let me check. I think someone has come.

*Sounds at the boundary gate.*

**Ramkrishna:** Eh! Where is the lock? I locked the gate myself the last time I was here.

**Pratap:** Where are you going, sir? Whom do you want to meet?

**Ramkrishna: (Angrily):** What do you mean where am I going? How did YOU enter?

**Santosh:** Go and see what the matter...is

**Ramdayal:** You look like a gentleman...are you sure you are not at the wrong address?

**Ramkrishna:** First you take possession of my house and then you ask if I am at the wrong address. OH God...what is happening!

**Ramdayal:** Your house? But we have purchased it. Six months ago. From Anand Property Dealers.

**Santosh:** We paid good money too. In cash at that!



**Ramkrishna:** I have not sold my property. All the original papers are with me. It will be best if you vacate my property before I report you to the police.

**Pratap:** Vacate the house? Have we got it for free? You can go to the police or wherever else **you like**.

**Ramdayal:** Pratap: Call up Anand.

*Dialling number. Phone rings at the other end.*

**Pratap:** Papa, he is not answering the phone.

**Ramkrishna:** I am returning to Dubai today. Vacate my house or else.

**Pratap:** Or else what will you do?

**Ramkrishna:** Or else I will go to the police and drag you to court. It will mean serious trouble for all of you.

**Pratap:** You can go wherever you like. We have the Lease deed papers and court papers also. We have paid good money...the house was not given to us in charity.

**Ramkrishna:** These are such terrible times...if anyone finds an unoccupied house, they simply move in. Fear the wrath of God. Be afraid of the law...this is an open and shut case under Section 420...you won't even get bail.

*Scene change. 2 weeks later. Bailiff reaches the house. Rings bell. Door opens.*

**Santosh:** Yes...who do you want?

**Bailiff hands her the notice.**

**Santosh:** What is this? Pratap...come here quickly. We have been served legal notice. Quick...read what it says.

**Pratap:** Ma, this is a court notice about our house. It alleges we have taken possession by means of fraud. That we have resorted to trickery, cheating and that we have also used fraudulent means to produce the documents which are all forgeries.

**Santosh:** Oh my God...and what about Anand? Were you able to talk with him?

**Pratap:** Mummy, I went to his office yesterday. It was locked. However, with a lot of difficulty I managed to speak briefly with him. He says we are not to worry...that the party has given him Power of Attorney and that is how the house was sold.

**Ramdayal:** We have to get a strong Defence lawyer. Rajshri has been recommended to me. She is a woman lawyer and is very well-known in her field.

**Pratap:** Yes Papa...she came to our college once to deliver a lecture. It was a grand lecture.

**Ramdayal:** Pratap, start your scooter. We have an appointment with her at 5 PM and need to reach with all documents.

*Sounds of scooter. Road sounds. Horns etc.*

**Pratap:** OK Papa, we have reached.

**Scooter stops. Parking. Door bell. Door opens**

**Ramdayal:** Namaste Madam. I am Ramdayal.

**Rajshri:** Namaste. Namaste. Kindly take your seat.

**Pratap:** Madam Advocate. These are all the papers of our house.

**Rajshri:** Ramdayal ji, you have told me all the details over the phone. However, since this is a criminal case of fraud we have to take swift action.

**Pratap:** Madam, Anand has duped us very badly. I remember that when you delivered a lecture in our college you said that every criminal leaves behind some clue.

**Rajshri:** Did you attend that lecture?

**Ramdayal:** Madam, this is my son Pratap. He is doing BSc in forensic science.

**Rajshri:** Ah! Then he will know that we will need to check all the documents and signatures for signs of forgery...we will do it at the Forensics Science Laboratory. I will appeal to the court for permission to do so.

**Ramdayal:** The Enquiry Officer from the local Police station came last week. I have stated my arguments. He was also suggesting that the authenticity of the documents be checked.

**Rajshri:** Do not fret...the police will get everything done once the court orders it.

**Pratap:** We have to study about all this. It is included in our course syllabus.

**Rajshri:** Look, the Registration and Lease-Deed have been done on the basis of the power of attorney. We need to verify the authenticity of the signature...that is we need to see if the signature belongs to Ramakrishna or someone else.

**Ramdayal:** Rajshri ji, my life's saving is at stake here. Not to mention the bank loan on top of it.

**Rajshri:** You were cheated Ramdayal ji. But repose your trust in the Judiciary.

**Pratap:** How do we check the authenticity of signatures?

**Rajshri:** Specialist will check the way the letters and the words are formed. The size of the letters, the slant and the way the letters are formed will all be checked.

**Ramdayal:** There must be hundreds of forgers in this world whose entire business rides on their trickery.

**Rajshri:** You are correct. Some forgers are so good that they can deceive even the best of experts.

**Pratap:** In your lecture you mentioned about Artificial Intelligence or AI.

**Rajshri:** Quite right. Technology has advanced so far that we can spot and catch even the most expert forger.

**Pratap:** Fantastic! Then, the forger cannot escape. Smart technology will triumph.

**Rajshri:** Artificial Intelligence has a big role to play here. This is a device that can alter handwriting, signature, typing, ink and illustrations into data.

**Ramdayal:** This is a cat and mouse game.

**Rajshri:** But the culprit always loses in the end. **(Laughs)**

**Ramdayal:** How strange that the machine understand it all.

**Pratap:** I think this is machine learning.

**Rajshri:** Quite right **(Laughs)** Machine leaning is a sub set of Artificial intelligence. It combines psychology and biology and uses a knowledge of statistics to reach its conclusion.

**Ramdayal:** I think the same applies to our fingerprints. **(Laughs)**

**Pratap:** Papa links everything to his experiences.

**Ramdayal:** My rapidly silvering hair attests to my long experience but Anand betrayed me.

**Pratap:** Don't worry, Papa. Anand will not escape unscathed.

**Rajshri:** Pratap is correct. Either Anand or Ramkrishna...one of them is lying.

**Pratap:** I think here too computer algorithms will play a major role.

**Rajshri:** You are correct. Algorithms have a role to play in this as well.

**Pratap:** Madam, I have read that there are many Apps for signature and handwriting recognition which are available on Google store and I-Phone store.

- Rajshri:** Quite right. Let me demonstrate using this phone. This is Abby Fine Reader...it is an optical character recognition application that is used across the globe. It works in conjunction with the camera installed in a smart phone to recognize written text.
- Pratap:** Madam, Mukesh Ambani has recently launched Jio Glass. It is a step forward in the Make in India initiative. It is somewhat on the lines of Google-Goggles...a major leap for technology.
- Ramdayal:** Google is slowly infiltrating every aspect of life.
- Rajshri:** Google Translate works on Android platform. It is also a major achievement in writing recognition software.
- Pratap:** Wow! The achievements of Artificial intelligence are really spectacular.
- Ramdayal:** We have come to you with a great deal of hope.
- Rajshri:** Ramdayalji, you are innocent. I will do my best to secure justice for you.

*Pratap and Ramdayal exit the chamber. Sound of scooter.*

*Sound changes to indicate Court premises.*

*Court is in session*

- Ramdayal:** It took years but praise the Lord...we got justice.
- Pratap:** It was all due to Rajshi Ma'am. How nicely she presented the evidence in court.
- Ramdayal:** Indeed Pratap. Rajshri Madam used technology to smash the web of lies that was constructed to tamper with the Power of attorney.
- Rajshri:** Shri Annad had linked everything in a sophisticated manner but modern technology had no trouble exposing his fabrications. The signature on the Power of Attorney belongs to Ramkrishna no doubt, because he transferred it to Anand many years ago so that the house could be placed on rent.
- Ramdayal:** Oh my God...how cunning these property dealers are!
- Pratap:** Justice is justice. The Court has delivered justice to Shri Ramkrishna as well.
- Rajshri:** Yes, so it has. Ramkrishna had given Annad the Power of Attorney over his property many years ago. This part was found to be authentic because the signature truly is that of Ramkrishna's. However Shri Anand did not pay Shri Ramkrishna his dues. That has to be fully refunded, by Anand along with due interest.

**Pratap:** So both parties...that is to say Ramkrishna did not check the signature on the documents of the Power of Attorney and Anand took advantage of this to play this dirty game with us.

**Rajshri:** So both are at fault...yet maybe not.

**Rajshri:** But you have to understand that trickery and fraud cannot always win. We have such devices today that can scan and alter whatever you have written with your pen.

**Pratap:** But you cannot always keep trying the same trick and expect to win.

**Ramdayal:** Innovation!

**Rajshri:** Yes, but there are many devices and apps with which forged signatures, distorted documents and fraudulent changes in original documents can be detected.

**Pratap:** Yes, didn't you see how Mister Anand was pleading before the Judge.

**Ramdayal:** Yes, now he has to pay a hefty monetary punishment plus serve time...not to speak about the loss of social standing and prestige.

**Rajshri:** What social prestige and standing do such people command?

**Pratap:** Madam, you spoke just now about devices and apps...you also mentioned these in the lecture you gave at our college.

**Rajshri:** Take for example, the MetaMoJi Note. This is a cross-platform note taking app, PDF annotation tool, and a digital scrapbook much like the colourful notebooks of yours. I-phone gives you Note-Plus which can decipher more than 50 languages. You can use Write Pad to give handwriting a digital shape.

**Pratap:** Yes, Madam. I have Pen to print app in my phone. I use it to scan and edit handwritten notes.

**Rajshri:** Yes, I am sure that the document writers and clerks in this court campus also have this app in their mobiles. It not only saves time but also minimizes mistakes.

**Ramdayal:** Rajshri Madam...we are beholden to you for securing justice for us. We have become your fans.

**Pratap:** Rightly said Papa. And Ma'am also explained forensic science in such a simple manner.

**Ramdayal:** It is such an auspicious day today. Santosh will become delirious with joy at the news.

**Pratap:** Yes, Papa. Let me call her.

**Ramdayal:** No...not over the phone. Let us keep the facts secret for just a few more moments. I want to share her joy in person. **(Laughs)**

**Rajshri:** Please convey my congratulations to her.

**Pratap and Ramdayal together:** OK Madam...we take your leave. See you!

**Rajshri:** Namaskar. Bye.

*Sounds of the scooter. Road sounds. Horn*

**Pratap:** Home, at last. **(Sound of a scooter being stopped)** Hello Mummy! We won the case.

**Santosh:** The Lord be praised.

**Ramdayal:** Along with the Lord, remember that technology played a huge role too.

**Pratap:** Mummy has gone to present herself before God in the Puja room. **(Laughs)**

**Santosh:** **(Puja bell)** Sings a hymn.

**Pratap:** Mummy, the Devi is pleased with you. **(Laughing tone)** This home was yours; is yours and forever will remain yours.

**All laugh.**